SONY

CAMERA CONTROL UNIT

CCU-550A
CCU-550AP

MAINTENANCE MANUAL Part 1

1st Edition

Serial No. 17001 and Higher: CCU-550A (UC)

Serial No. 37001 and Higher: CCU-550A (J)

Serial No. 47001 and Higher: CCU-550AP (CE)

⚠警告

このマニュアルは，サービス専用です。
お客様が，このマニュアルに記載された設置や保守，点検，修理などを行うと感電や火災，人身事故につながることがあります。
危険をさけるため，サービストレーニングを受けた技術者のみご使用ください。

⚠WARNING

This manual is intended for qualified service personnel only.
To reduce the risk of electric shock, fire or injury, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

⚠WARNUNG

Die Anleitung ist nur für qualifiziertes Fachpersonal bestimmt.
Alle Wartungsarbeiten dürfen nur von qualifiziertem Fachpersonal ausgeführt werden. Um die Gefahr eines elektrischen Schlages, Feuergefahr und Verletzungen zu vermeiden, sind bei Wartungsarbeiten strikt die Angaben in der Anleitung zu befolgen. Andere als die angegeben Wartungsarbeiten dürfen nur von Personen ausgeführt werden, die eine spezielle Befähigung dazu besitzen.

⚠AVERTISSEMENT

Ce manual est destiné uniquement aux personnes compétentes en charge de l’entretien. Afin de réduire les risques de décharge électrique, d’incendie ou de blessure n’effectuer que les réparations indiquées dans le mode d’emploi à moins d’être qualifié pour en effectuer d’autres. Pour toute réparation faire appel à une personne compétente uniquement.

Attention-when the product is installed in Rack:

1. **Prevention against overloading of branch circuit**
   When this product is installed in a rack and is supplied power from an outlet on the rack, please make sure that the rack does not overload the supply circuit.

2. **Providing protective earth**
   When this product is installed in a rack and is supplied power from an outlet on the rack, please confirm that the outlet is provided with a suitable protective earth connection.

3. **Internal air ambient temperature of the rack**
   When this product is installed in a rack, please make sure that the internal air ambient temperature of the rack is within the specified limit of this product.

4. **Prevention against achieving hazardous condition due to uneven mechanical loading**
   When this product is installed in a rack, please make sure that the rack does not achieve hazardous condition due to uneven mechanical loading.

CAUTION

Danger of explosion if battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer.
Dispose of used batteries according to the manufacturer's instructions.

Vorsicht!

Explosionsgefahr bei unsachgemäßem Austausch der Batterie.

Ersatz nur durch denselben oder einen vom Hersteller empfohlenen ähnlichen Typ.
Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

ATTENTION

Il y a danger d'explosion s'il y a remplacement incorrect de la batterie.

Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur.
Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

ADVARSEL!

Lithiumbatteri-Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri af samme fabrikat og type.
Levér det brugte batteri tilbage til leverandøren.

For the customers in the U.S.A. and Canada

RECYCLING NICKEL-CADMIUM BATTERIES

Nickel Cadmium batteries are recyclable. You can help preserve our environment by returning your unwanted batteries to your nearest point for collection, recycling or proper disposal.
Note: In some areas the disposal of nickel cadmium batteries in household or business trash may be prohibited.

RBRC (Rechargeable Battery Recycling Corporation) advises you about spent battery collection by the following phone number.

Call toll free number: 1-800-822-8837
(United States and Canada only)

Caution: Do not handle damaged or leaking nickel-cadmium batteries.

Voor de klanten in Nederland

Dit apparaat bevat een MnO_2-Li batterij voor memory back-up.

Raadpleeg uw leverancier over de verwijdering van de batterij op het moment dat u het apparaat bij einde levensduur afdankt.

Gooi de batterij niet weg. maar lever hem in als KCA.

Bij dit produkt zijn batterijen geleverd. Wanneer deze leeg zijn, moet u ze niet weggooien maar inleveren als KCA.

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Manual Structure

Purpose of this manual

This manual is the maintenance manual part 1 of Camera Control Unit CCU-550A/550AP.
This manual is intended for use by trained system and service engineers, and provides the installation and maintenance information that is necessary at the time of primary service.

Related manuals

Besides this “maintenance manual part 1”, the following manuals are available for this unit.

- **Operation Manual (Supplied with the MSU-750)**
  This manual is necessary for application and operation of this unit.

- **Maintenance Manual Part 2 (Available on request)**
  This manual describes the information items on maintenance, and items that premise the service based on the components parts such as adjustments, parts list, semiconductor pin assignments, block diagrams, schematic diagrams and board layouts.
  If this manual is required, please contact your local Sony Sales Office/Service Center.

- **System Manual (Available on request)**
  This manual is necessary for connection and operation of video camera and other peripheral equipment.
  If this manual is required, please contact your local Sony Sales Office/Service Center.

Contents

The followings are summaries of all the sections for understanding the contents of this manual.

Section 1 Installation Overview

Describes information about operating environment, connector input/output signals and instance of system configuration.

Section 2 System Setup

Describes setting and adjustment for connecting this unit to the camera system.

Section 3 Service Overview

Describes information about board locations, circuit description and function of internal switches.

Section 4 Spare Parts

Describes spare parts list such as plug-in board, fan and fuse used in this unit.

Section 5 Overall Block Diagram

Describes overall block diagram.

Section 1
Installation Overview

1-1. Supplied Accessories

Accessories	Sony Part No.	Qt'y
Remote indicator	A-8278-054-A	1
⚠Power cord (for CCU-550A) With 3P-plug Length: about 2.4 m Rated voltage: 125 V Rated current: 10 A	1-551-812-11	1
⚠Power cord (for CCU-550AP) Without plug Length: about 2.5 m Rated voltage: 250 V Rated current: 10 A	1-782-929-11	1
Plug (4P)	1-560-343-11	1
Plug holder (for CCU-550A) (for CCU-550AP)	2-990-242-01 3-613-640-01	1 1
Operation Manual	————	1
Maintenance Manual Part 1	————	1

1-2. Adaptive Connectors and Cables

1-2-1. Connector Input/Output Signals

The connector input/output signals are described below.

Rear panel

[Input signals]

- REFERENCE (BNC) 40 IRE (300 mV p-p), VBS, burst sync, loop through
- RET (BNC × three systems) 140 IRE (1.0 V p-p), VBS, or VS, loop through
- PROMPTER (BNC) 140 IRE (1.0 V p-p), VBS, or VS, loop through

  PROMPTER/RET3 (Selectable by S1001 on the DM board.)

[Output signals]

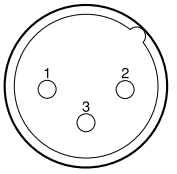
- R (BNC) 700 mV p-p
- G (BNC) 700 mV p-p
- B (BNC) 700 mV p-p
- Y (BNC) 100 IRE, 40 IRE (sync) (for CCU-550A)
  700 mV p-p, 300 mV p-p (sync) (for CCU-550AP)
- R-Y (BNC) 700 mV p-p (75 % color bars) (for CCU-550A)
  525 mV p-p (75 % color bars) (for CCU-550AP)
- B-Y (BNC) 700 mV p-p (75 % color bars) (for CCU-550A)
  525 mV p-p (75 % color bars) (for CCU-550AP)
- WF (BNC) 100 IRE/140 IRE (ENC) (for CCU-550A)
  700 mV p-p/1.0 V p-p (ENC) (for CCU-550AP)
- PIX (BNC) 140 IRE (1.0 V p-p)
- VBS (BNC × three systems) 140 IRE (1.0 V p-p)
- SYNC (BNC) 300 mV p-p
- SERIAL OUTPUT (BNC × two systems) (when BKP-5972 is installed)
  D1 format serial digital, SMPTE 259M/ITU-R BT-656

  Y/G, R-Y/R, B-Y/B selection (Selectable by S401 on the VA board.)

[Input/output signals]

- TRIAX King type (for CCU-550A)
  Fischer type (for CCU-550AP)
- COAX (BNC) (Refer to section 1-6. DM Connector Setting.)

MIC OUTPUT CH1/CH2 (XLR 3P, MALE)

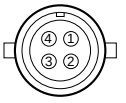


(EXTERNAL VIEW)

(0 dBu = 0.775 Vrms)

No.	Signal	Specifications
1	MIC OUT (G)	0 dBu/−20 dBu
2	MIC OUT (X)	(Selectable with S201,
3	MIC OUT (Y)	S251/AU board)

WF MODE (4P FEMALE)

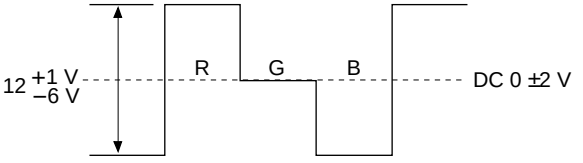


(EXTERNAL VIEW)

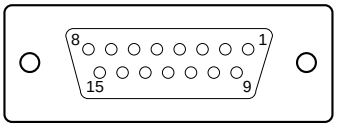
(0 dBu = 0.775 Vrms)

No.	Signal	Specifications
1	SEQ CONT OUT (G)	OPEN COLLECTOR +(PNP)/−(NPN)
2	SEQ CONT OUT (X)	(Selectable with S901/VA board)
3	STAIR CASE OUT (X)	*1)
4	STAIR CASE OUT (G)	GND for STAIR CASE

*1) Stair Case signal



MIC REMOTE (D-Sub 15P, FEMALE)



(EXTERNAL VIEW)

(0 dBu = 0.775 Vrms)

No.	Signal	Specifications
1	+5.5 V OUT	Max. 70 mA
2	AUX4 (*4 TALLY GND)	(*4 TALLY for GND)
3	AUX2 (*4 G TALLY OUT)	(*4 Q405 (NPN) /AT board ON (GND):Max 30 mA)
4	AUX1 (*4 R TALLY OUT)	(*4 Q403 (NPN) /AT board ON (GND):Max 30 mA)
5	CHU MIC AMP GAIN IN CONT2	*2) See below
6	CHU MIC AMP GAIN IN CONT1	*2) See below
7	CHU MIC AMP GAIN IN CONT0	*2) See below
8	MIC1 GAIN CONT ON/OFF IN	*3) See below
9	GND (+5.5 V)	GND for +5.5 V
10	AUX3 (*4 TALLY OUT)	(*4 R/G TALLY OUT Q409 (NPN) /AT board ON (GND):Max 30 mA)
11	NC	No connection
12	16:9/4:3 SELECT EN IN	+5.0 V (or OPEN) : DIS-EN GND : EN
13	16:9/4:3 SELECT IN	+5.0 V (or OPEN) : 4:3 GND : 16:9
14	AUX9	
15	MIC GAIN CONT2 IN	*2) See below

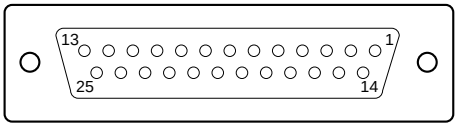
*2)

CONT0	CONT1	CONT2	CHU MIC1 AMP GAIN
H	H	H	60 dB
L	H	H	50 dB
H	L	H	40 dB
L	L	H	30 dB
H	H	L	20 dB

*3)

8pin	15pin	MIC GAIN CONT
L	L	MIC1/MIC2 ON
L	H	MIC1 ON
H	L	MIC2 ON
H	H	INTERNAL SET

INTERCOM/TALLY/PGM (D-Sub 25P, FEMALE)



(EXTERNAL VIEW)

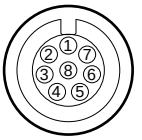
(0 dBu = 0.775 Vrms)

No.	Signal	Specifications
1	ENG (R) (X) OUT	ENG SYSTEM RECEIVE
2	ENG (R) (Y) OUT	0 dBu BALANCED
3	ENG (G)	GND for ENG
4	ENG (T) (X) IN	ENG SYSTEM TALK
5	ENG (T) (Y) IN	0 dBu BALANCED
6	PGM (X) IN	–20 dBu/0 dBu
7	PGM (Y) IN	(Selectable with
8	PGM (G) IN	S451/AU board)
9	GND	GND for AUX
10	AUX8	
11	R TALLY (X) IN	ON: 24 V dc, TTL (H), SHORT
12	R TALLY (Y) IN	OFF: 0 V dc, TTL (L), OPEN
13	GND	CHASSIS GND
14	PROD (R) (X) OUT	PROD SYSTEM
15	PROD (R) (Y) OUT	RECEIVE 0 dBu BALANCED
16	PROD (G)	GND for PROD
17	PROD (T) (X) IN	PROD SYSTEM TALK
18	PROD (T) (Y) IN	0 dBu BALANCED
19	NC	No connection
20	NC	No connection
21	NC	No connection
22	AUX7	
23	AUX6	
24	G TALLY (X) IN	ON: 24 V dc, TTL (H), SHORT
25	G TALLY (Y) IN	OFF: 0 V dc, TTL (L), OPEN

∗4 To use these interface signals, modification for AT board is required. For more details, please consult your Sony service representative.

REMOTE (8P, FEMALE)

RCP/CNU

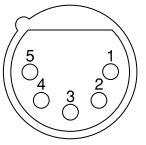


(EXTERNAL VIEW)

No.	Signal	Specifications
1	TX (+)	CCU SERIAL DATA
2	TX (–)	
3	RX (+)	RCP/CNU/BVP/MSU/VCS
4	RX (–)	SERIAL DATA
5	TX GND	GND for TX
6	POWER (+) OUT	RCP POWER, +30 V
7	POWER (–) OUT	GND for POWER
8	SPARE	
	CHASSIS GND	CHASSIS GND

Front panel

INTERCOM (5P, FEMALE)



(EXTERNAL VIEW)

(0 dBu = 0.775 Vrms)

No.	Signal	Specifications
1	INCOM (T) IN (Y)	–20 dBu (CARBON MIC)
2	INCOM (T) IN (X)	–60 dBu (DYNAMIC MIC)
3	INCOM (T) IN (G)	GND for INCOM
4	INCOM (R) OUT (X)	Max. 12 dBu
5	PGM OUT (X)	Max. 12 dBu

1-2-2. Connection Connector

Use the connectors below or the equivalent at its tip when cables are connected to each connector on the connector panel during installation and servicing.

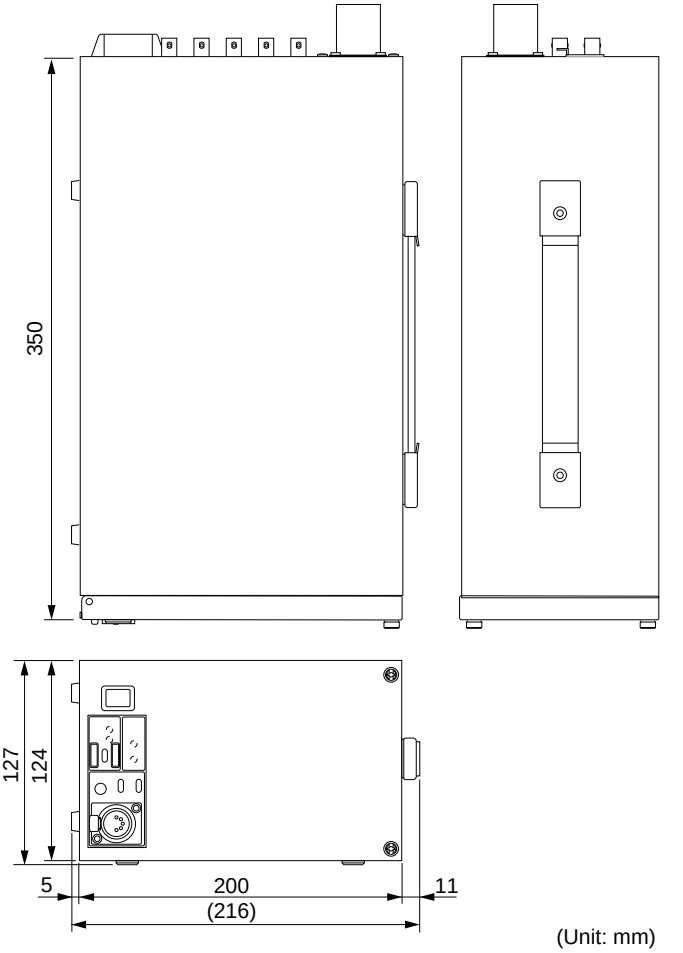
Connector name	Connected connector/cable
REFERENCE RET 1/2/3 PROMPTER R/G/B Y/R-Y/B-Y WF PIX VBS 1/2/3 SERIAL OUTPUT COAX (BNC type)	1-569-370-12 plug, BNC
MIC OUTPUT CH1/CH2 (3P, MALE)	1-508-083-00 XLR, 3-pin FEMALE or CANNON XLR-3-11C or the equivalent
MIC REMOTE (15P, FEMALE)	1-506-582-11 D-Sub,15P MALE 15-pin male, or JAE DA-15PF-N or the equivalent
INTERCOM/TALLY/PGM (25P, FEMALE)	D-Sub, 25-pin male, JAE DA-25PF-N or the equivalent
WF MODE (4P, FEMALE)	1-506-155-00 plug, 4-pin male (supplied)
REMOTE (8P, FEMALE)	1-766-848-11 plug, 8-pin male, or CCA cable assembly (optional) CCA-5-10 (10 m) CCA-5-3 (3 m)
INCOM (5P, FEMALE)	1-508-370-11 XLR, 5-pin male, or CANNON XLR-5-12C or the equivalent

1-3. Operating Environment

Operating temperature:	−10 ˚C to +40 ˚C
Storage temperature:	−20 ˚C to +50 ˚C
Humidity:	Noncondensing
Supply voltage:	100 V to 240 V ±10 % (50/60 Hz)
Power consumption:	1.8 A (maximum)

1. Do not put the unit in a place subject to high temperature or in a location near heat sources.
2. Do not put the unit in a place subject to excessive electric and magnetic fields.
3. Put the unit in a dry and well-ventilated place.
4. Do not put the unit in a place subject to excessive dust and mechanical shock.
5. Do not put the unit in a place subject to direct sunlight and light.

1-4. Outer Dimensions



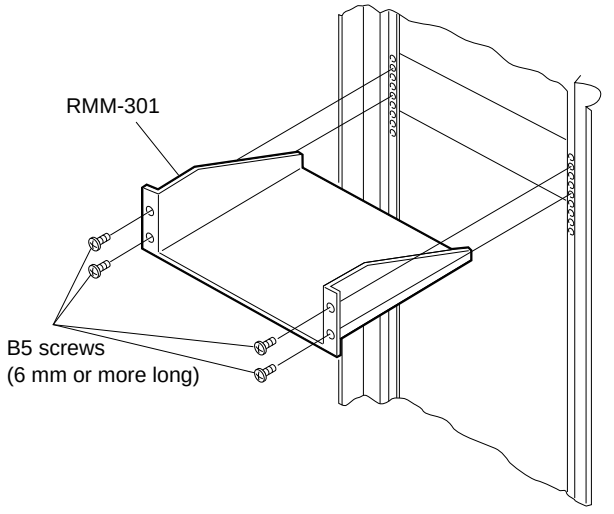
(Unit: mm)

1-5. Mounting on 19-Inch Rack

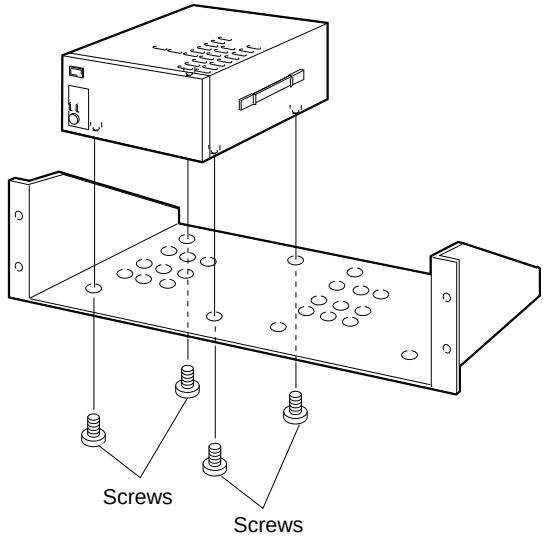
Two CCU-550A/550APs can be mounted on a 19-inch EIA standard rack in parallel by using rack mount adaptor RMM-301 (optional).

Mounting

1. Tighten the four rack mount screws.



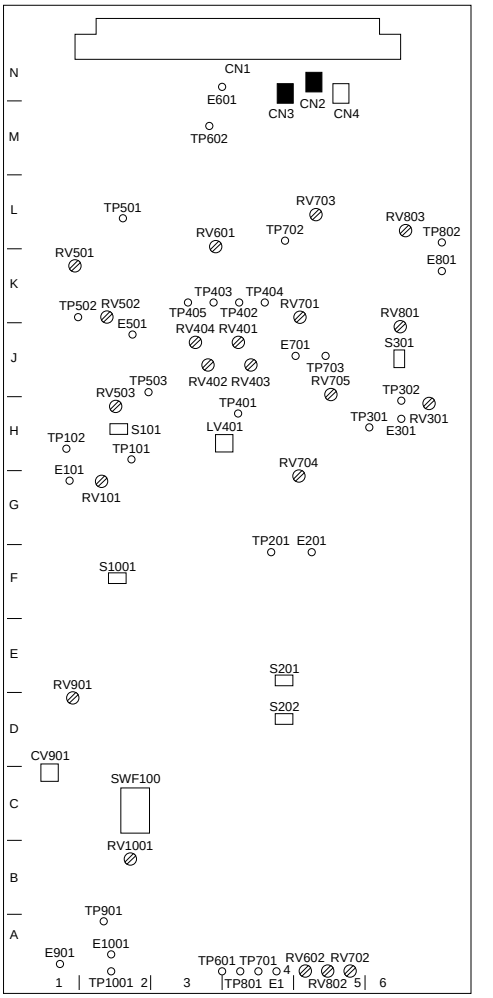
2. Mount the CCU-550A/550AP on the rack mount adaptor as shown in the figure below and tighten the four fixing screws (supplied for RMM-301).



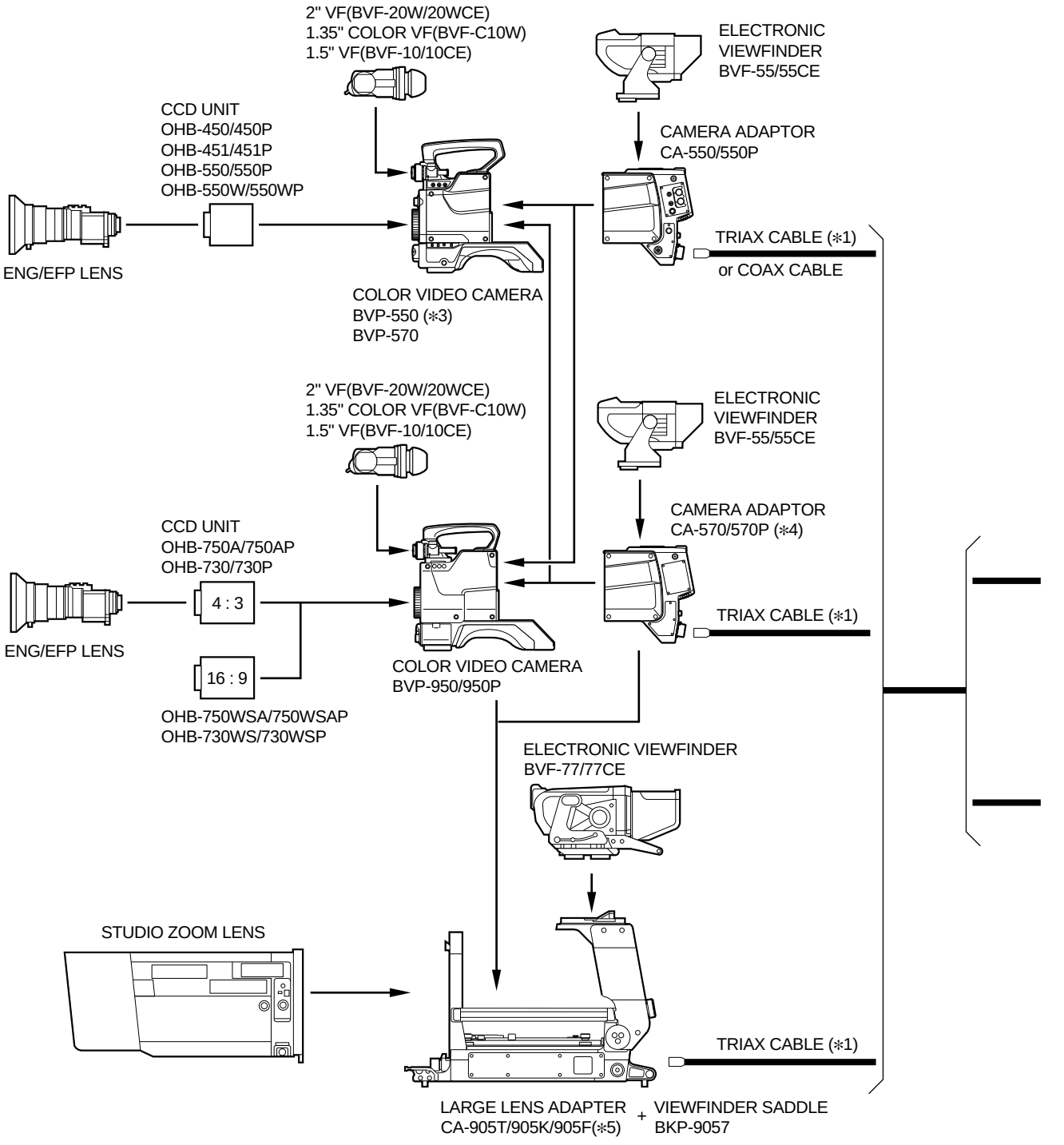
1-6. To Control the Camera Using COAX Cable

The COAX connector (BNC) on the rear panel is used when the camera head and CCU are connected using a BNC cable instead of a triax cable. In this case, since no power is supplied to the camera head side, use a camera head that conforms to the stand-alone specification. For the camera head side, convert the triax connector into a BNC connector. For the CCU side, replace the connector on the DM-110 board. (Replace the RF cable connected to CN2 by CN3.)

DM-110 board



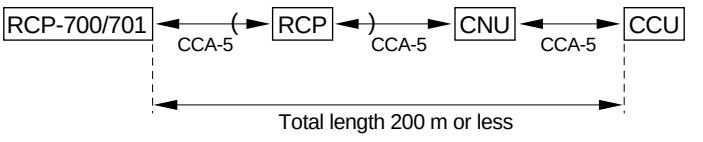
1-7. Instance of System Configuration



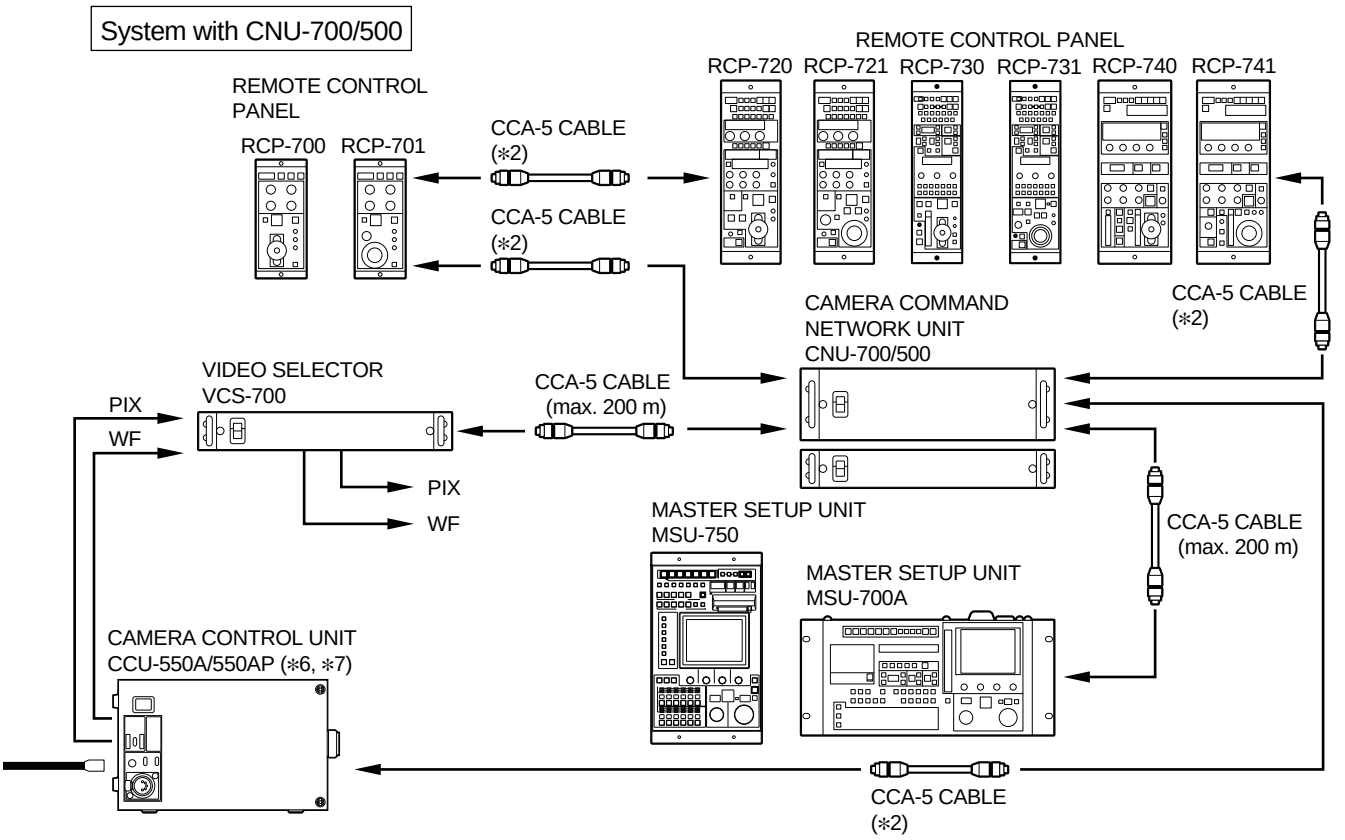
*1: Triax cable length

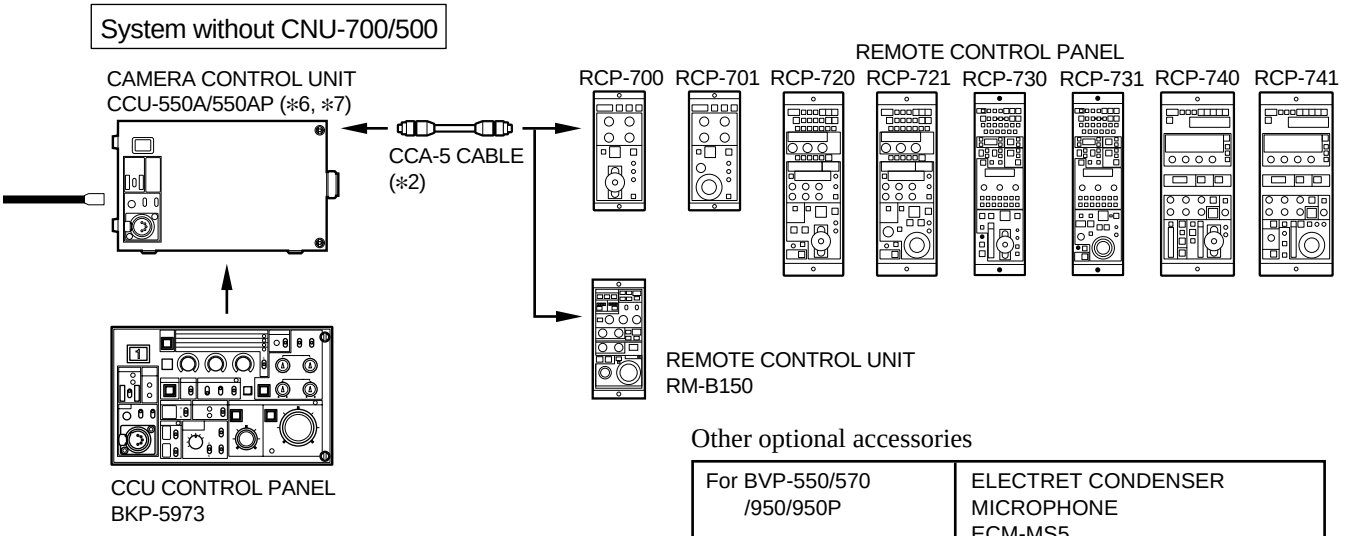
Diameter	Extensible length	Cable-length limitation for prompter signal transmission
8.5 mm	700 m	500 m
14.5 mm	1400 m	100 m

*2: CCA-5 CABLE LENGTH



http://getMANUAL.com




System without CNU-700/500
REMOTE CONTROL PANEL
CAMERA CONTROL UNIT CCU-550A/550AP (∗6, ∗7)
RCP-700 RCP-701 RCP-720 RCP-721 RCP-730 RCP-731 RCP-740 RCP-741
CCA-5 CABLE (∗2)
REMOTE CONTROL UNIT RM-B150
CCU CONTROL PANEL BKP-5973

∗3: When using the CCU-550A/550AP in conbination with the BVP-550, confirm that the ROM version of IC36/AT-95 board of the BVP-550 is Ver.1.14 or higher.

∗4: When the CA-570/570P is connected with the CCU-550/550P, use of intercom transmission channel is limited to only one channel. In this case, use the INCOM 1 connector of the CA-570/570P.

∗5: Since CA-550/550P doesn't conform to CA-905K/905F, connect CA-570/570P when using CA-905K/905F

∗6: The CCU-550A/550AP incorporating the DC Power Unit BKP-5974 cannot be used together with the CA-905K/905F. Be sure to use the CCU-550A/550AP incorporating the BKP-5974 when using the CA-905K/905F.

∗7: The viewfinder BVF-7700 cannot be used together with CCU-550A/550AP had been connected. Be sure to use the CCU-700A/700AP.

Other optional accessories

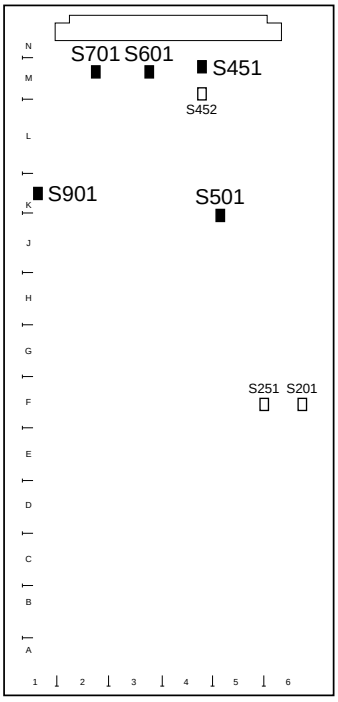
For BVP-550/570 /950/950P	ELECTRET CONDENSER MICROPHONE ECM-MS5
	MICROPHONE C-74 (Sony P/N 1-542-099-11)
	CRADLE SUSPENSION CRS-3P
	CARRYING CASE LC-303SFT
For CA-550A/550AP	TELEPROMPTER UNIT BKP-5971
For CCU-550A/550AP	SDI OUT BOARD BKP-5972
	DC POWER UNIT BKP-5974

Section 2
System Setup

2-1. Audio System

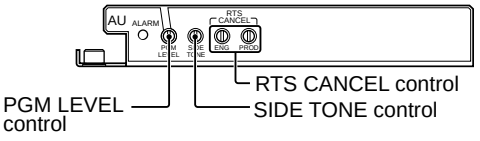
2-1-1. Settings for the Intercom Systems

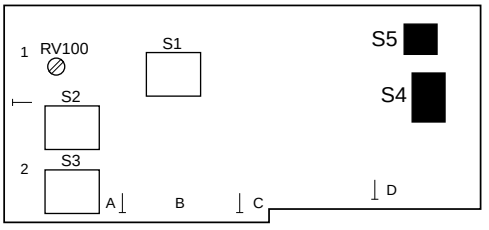
This unit can use two intercom lines independently, a producer line and an engineer line. The two lines can be selected by means of the camera adapter CA-550/550P/570/570P or the video camera BVP-750/750P.
Since this unit conforms to the 4W and RTS intercom systems, set the internal switch in accordance with the system to be used.



AU-231 board

AU board





AU-236 board

1. Selecting the intercom system

Select the intercom system, 4W or RTS, for each engineer or producer line. Also, select the number of intercom lines (1 channel or 2 channels).

- **For the producer line:**
  Set the switch S601 (PROD SELECT) on the AU-231 board according to the intercom system to be used.
  Factory setting: 4 W
- **For the engineer line:**
  Set the switch S701 (ENG SELECT) on the AU-231 board according to the intercom system to be used.
  Factory setting: 4 W
- **When one-channel intercom line is used.:**
  Set the switch S901 (INPUT SELECT) on the AU-231 board to “1CH.” Connect the intercom line to producer line of the unit.
  When two-channel intercom line is used.:
  Set the switch S901 (INPUT SELECT) on the AU-231 board to “2CH.”
  Factory setting: 2CH

RTS cancel adjustment

If the system is in RTS intercom, it is necessary to perform the following adjustments as well.

(1) Connect a headset to the INCOM connector on the front panel. Complete the headset setting referring to “2. Setting the headset microphone” described later.
(2) Turn the SIDE TONE control on the panel of the AU-231 board fully counterclockwise to minimize the side tone level.
(3) Set the MIC/PGM switch on the front panel to “MIC-ON”.
(4) Set the PROD/PRIV/ENG switch on the front panel to “PROD”.
(5) While speaking through the headset microphone, adjust the PROD RTS CANCEL control on the panel of the AU-231 board to minimize the side tone level.
(6) Set the PROD/PRIV/ENG switch on the front panel to “ENG”.
(7) While speaking through the headset microphone, adjust the ENG RTS CANCEL control on the panel of the AU-231 board to minimize the side tone level.
(8) Reset the SIDE TONE control on the panel of the AU-231 board to the original position.

Note

When the RTS system is selected by S601 or S701, be sure to connect this camera system to the RTS intercom system. Otherwise oscillation may occur.

2. Setting the headset microphone

Set the switch S4 on the AU-236 board according to the type of headset microphone connected to the INCOM connector on the front panel.

When a carbon microphone is used: CM (factory setting)

When a dynamic microphone is used: DYN

Note

When the switch S4 is set to DYN, the switch S5 is also set according to the type of microphone, balanced or unbalanced.

When a balanced type microphone is used: OPEN (factory setting)

When an unbalanced type is used: GND

- **Side tone adjustment**

Adjust the side tone level through the headset connected INCOM connector on the front panel to the desired level by the SIDE TONE control on the panel of the AU-231 board.

3. Mixing with a program audio signal

A program audio signal can be mixed with an intercom audio signal of the headset connected to the INCOM connector on the front panel by switching the switch S501 (PGM MIX) on the AU-231 board.

To mix the signals: MIX

To output L/R separately: SEP

Not to mix the signals: OFF (factory setting)

4. Setting the input signal level of the program audio signal

Set the switch S451 (PGM IN) on the AU-231 board to 0 dB or −20 dB, according to the audio signal level of the camera system.

Factory setting: 0 dB

- **Mix level adjustment of program audio signal**

  Adjust the mix level of the program audio signals through the headset connected to the INCOM connector on the front panel to the desired level by the PGM LEVEL control on the panel of the AU-231 board.

5. Selecting the intercom line connected to the INCOM connector

Select the intercom line connected to the INCOM connector by the switch on the front panel as follows.

- **To connect the producer line:**

  Set the PROD/PRIV/ENG switch to PROD.
- **To connect the engineer line:**

  Set the PROD/PRIV/ENG switch to ENG.
- **To connect only the camera:**

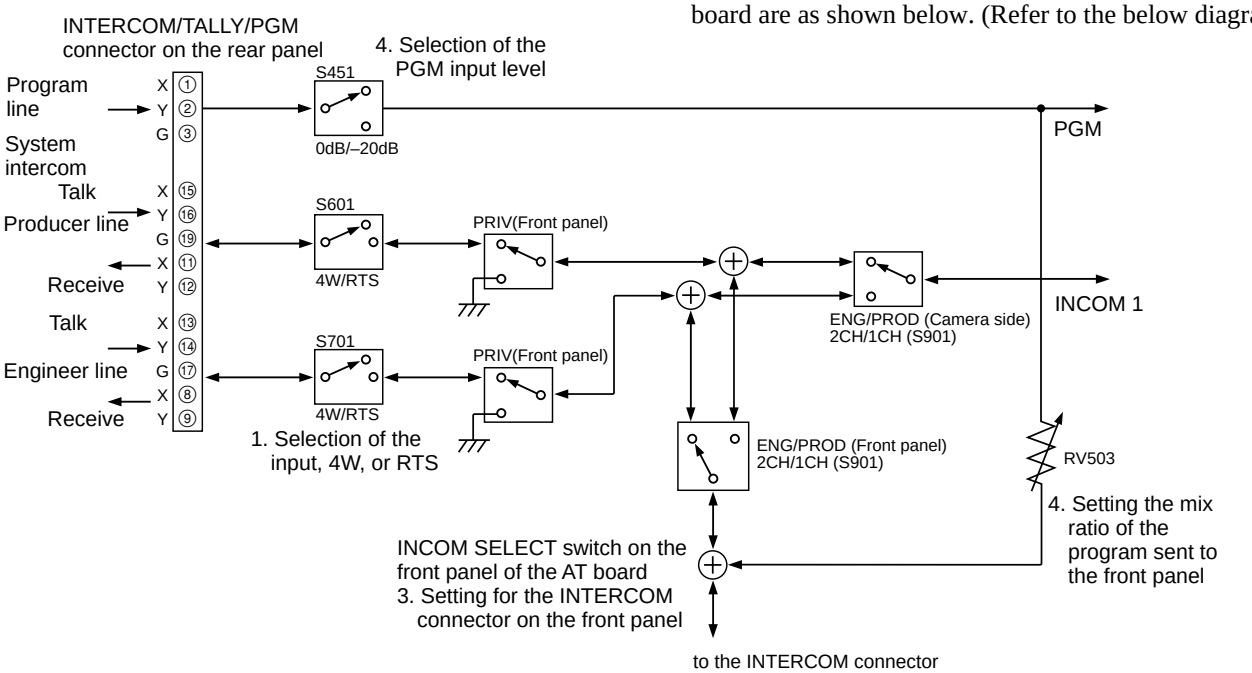
  Set the PROD/PRIV/ENG switch to PRIV. When the switch is set to PRIV, the external intercom line is deactivated, and only the intercom with the camera is activated.

Note

If switch S901 (INPUT SELECT) on the AU-231 board is set to “1CH” position, it is connected and fixed to the producer line regardless of the PROD/PRIV/ENG switch position on the front panel or camera.

6. Switch settings on the AU-231 board

The switch settings and the signal flow of the AU-231 board are as shown below. (Refer to the below diagram.)


INTERCOM/TALLY/PGM connector on the rear panel
4. Selection of the PGM input level
Program line
System intercom
Talk
Producer line
Receive
Talk
Engineer line
Receive
X Y G X Y G X Y G X Y
① ② ③ ⑮ ⑯ ⑲ ⑪ ⑫ ⑬ ⑭ ⑰ ⑧ ⑨
S451
0dB/–20dB
PGM
S601
4W/RTS
PRIV(Front panel)
ENG/PROD (Camera side) 2CH/1CH (S901)
INCOM 1
S701
4W/RTS
PRIV(Front panel)
1. Selection of the input, 4W, or RTS
ENG/PROD (Front panel) 2CH/1CH (S901)
RV503
4. Setting the mix ratio of the program sent to the front panel
INCOM SELECT switch on the front panel of the AT board
3. Setting for the INTERCOM connector on the front panel
to the INTERCOM connector on the front panel

2-1-2. Setting the Program Microphone Signal

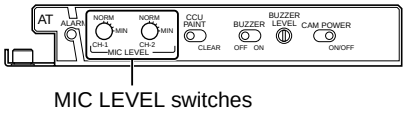
This unit can output the two program microphone lines (MIC 1 and MIC 2) after receiving the independent two program microphone lines (MIC 1 and MIC 2) from the video camera BVP-550/570/750/750P/950/950P and camera adapter CA-550/550P/570/570P.

Remote control of the input level of a microphone

The level of the microphone signal input to the MIC connector on the BVP-550/570/750/750P/950/950P or the MIC connector on the CA-550/550P/570/570P can be controled by this unit. The adjustable range is from −60 dBu to −20 dBu in 10 dBu steps. Select either step of the following.

1. Microphone input level adjustment by the MIC LEVEL switches

AT board



MIC LEVEL switches

When nothing is connected to the MIC REMOTE connector or the level of pin 8 (MIC 1) and pin 15 (MIC 2) of the MIC REMOTE connector is high, the microphone input level can be adjusted by the MIC LEVEL switches on the front panel of the AT board.
Factory setting: NORM (60 dBu)

2. Microphone input level adjustment from the MIC REMOTE connector

The microphone input level control is set by pin 8 and pin 15 of the MIC REMOTE connector on the rear panel.
The microphone input level is controlled by pin 5, pin 6, and pin 7 of the MIC REMOTE connector.

Setting the microphone input level control

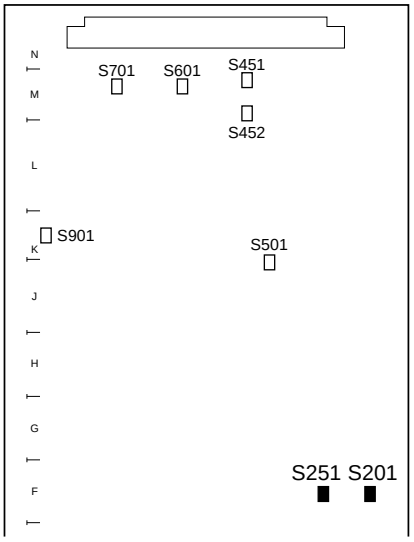
Pin No.		Microphone connector	
8	15	MIC IN CH-1	MIC IN CH-2
L	L	ON	ON
L	H	ON	OFF
H	L	OFF	ON
H	H	Internal settings	

Setting the microphone input level

Pin No.	7	6	5
−60 dBu	H	H	H
−50 dBu	L	H	H
−40 dBu	H	L	H
−30 dBu	L	L	H
−20 dBu	H	H	L

H: +5 V (C-MOS level)
L: GND
Input impedance: 100 kΩ +5 V pull up

Setting the microphone output level



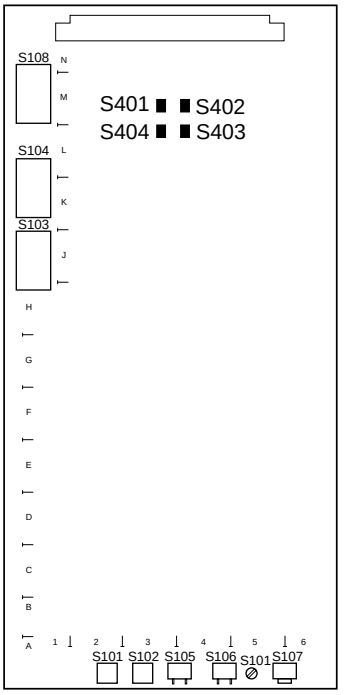
AU-231 board

The level of the signal output from the MIC OUTPUT connectors on the rear panel is selected (0 dBu, −20 dBu) by the switches on the AU-231 board.
MIC OUTPUT 1 level: switch S201 (MIC 1 LEV)
MIC OUTPUT 2 level: switch S251 (MIC 2 LEV)
Factory setting: 0 dBu (Both S201 and S251)

2-2. Control System

2-2-1. Setting for the Tally System

This unit conforms to red-tally and green-tally systems and also to contact supply and 24 V power supply. Set switches on the AT board according to the tally system to be used.



AT board

Set the switches as follows:

Settings for the tally system

	Red tally		Green tally	
Switches	**S401**	**S404**	**S402**	**S403**
Contact supply	CONTACT	—	CONTACT	—
24 V power supply	POWER	POWER	POWER	POWER
5 V power supply	POWER	TTL	POWER	TTL

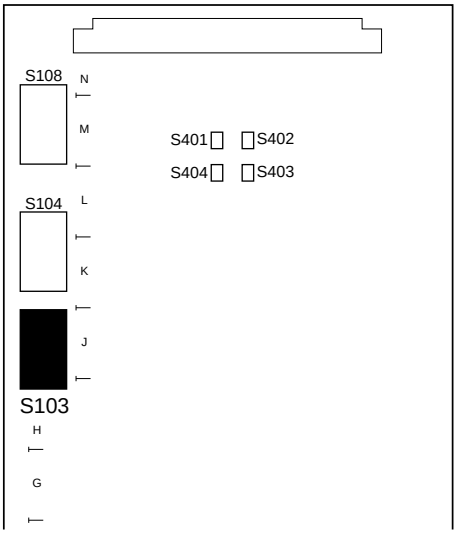
At the factory, all switches are set to POWER. When the tally system is not used, set the switches S401 and S402 on the CCU-550A/550AP to CONTACT.

2-2-2. Setting the Camera Numbers

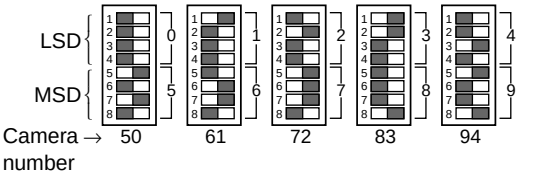
CNU-700/500 unused system

Set the camera numbers by the switch S103 on the AT-111 board.

Set the least significant decimal digit (LSD) with switches 1 through 4, and the most significant decimal digit (MSD) with switches 5 through 8 as shown below. Each switch can set from “0” through “f,” but “a” through “f” are not effective. Camera numbers set with these switches are from 1 through 96.



(EX.)



AT-111 board

CNU-700/500 used system

Numbers of the CCU connector on the rear panel of the CNU-700/500 correspond to an actual camera number. For instance, the video camera of the CCU connected to the CCU 1 connector becomes the camera number 1. For more details, see system manual.

2-3. Video System

The signal levels of the units used in the BVP-500/700/900-series camera system are set to the standard values at the factory. Before starting operation, check the levels of the units, and adjust them if necessary. Basically, adjustment is performed with the controls and switches on the internal boards, but some adjustment can be made from the maintenance menu of the MSU-700/750. For such items, perform basic adjustment with the switches and controls on the boards, and fine adjustment with the maintenance menu.

2-3-1. Selecting the Input/Output Signal

Select the signal of the input and output connectors in accordance with the video system to be installed.

Setting the VBS3 OUT connector

Set the signal output from the VBS3 OUT connector on the rear panel by the switch S1201 (VBS3/SYNC) on the VA board.
To output VBS signal: VBS (factory setting)
To output SYNC signal: SYNC

Setting the Y/G, R-Y/R and B-Y/B OUT connectors

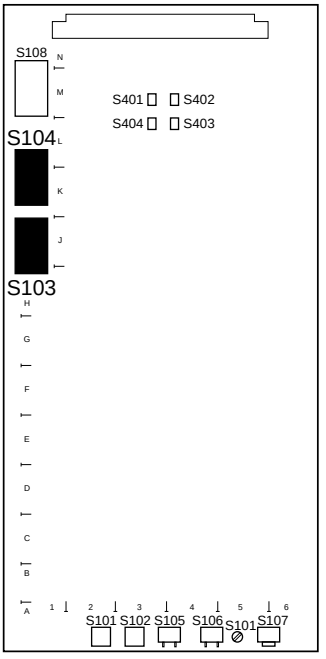
Set the signal output from the Y/G, R-Y/R and B-Y/B OUT connectors on the rear panel by the switch S401 (Y•R-Y•B-Y/RGB OUT) on the VA board.
To output Y/R-Y/ B-Y signal: Y/R-Y/ B-Y (factory setting)
To output RGB signal: RGB

Setting the PROMPT/RET3 IN connector

Set the signal input to the PROMPT/RET3 IN connector on the rear panel by the switch S1001 (PROMPT SELECT RET3/PROMPT) on the DM board.
To use as return video input: RET3
To use as prompter input: PROMPTER (factory setting)

2-3-2. Resetting the Control Data

Before adjustment, reset the control data of the unit.



AT-111 board

1. Set the switches S103-1 through S103-8 and S104-1 through S104-7 on the AT board to OFF.
2. Set the S104-8 to ON.
3. Turn on the power of the CCU-550A/550AP.
4. Turn off the power of the CCU-550A/550AP. The control data are then reset.
5. Set the switches S103-1 through S103-8 and S104-1 through S104-8 to OFF or to their previous settings.

The switches S103-1 through S103-8 and S104-1 through S104-8 are all set to OFF at the factory.

2-3-3. Adjusting the Phases of the Signals

Adjust the signal phase of the unit. Before starting adjustment, input the following sync signals to the unit and all equipment connected.

CCU-550A/550AP

A reference signal of the system including a burst and sync signals

Signal level: 40 IRE (for CCU-550A) or
0.3 V p-p (for CCU-550AP)

Waveform monitor, vectorscope

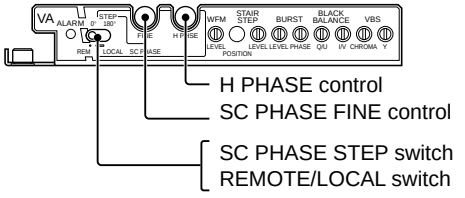
A reference sync signal of the system specified by the equipment to be used

Adjusting the phases of the sync signal

Adjust the phases of the output signals so that the phases of the output signals align with the phase of the reference signal. The phase can be adjusted using the controls and switches on the VA board and also with the maintenance menu of the MSU-700/750.

Adjusting on the VA-175 board

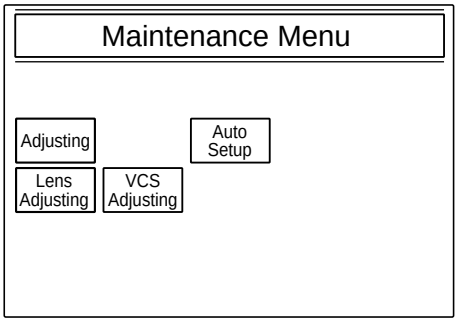
VA board



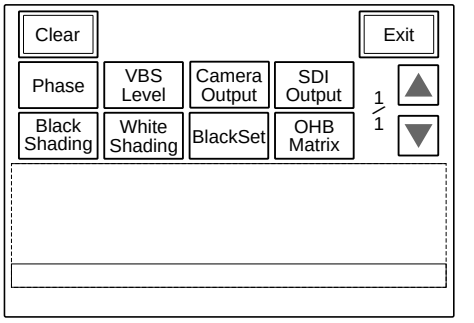
1. Set the REMOTE/LOCAL switch on the VA-175 board to LOCAL.
2. Roughly adjust the SC phase with the SC PHASE STEP switch.
3. Perform fine adjustment of the SC phase with the SC PHASE FINE control.
4. Adjust the H phase and SC-H phase with the H PHASE control.

Adjusting using the MSU-700/750

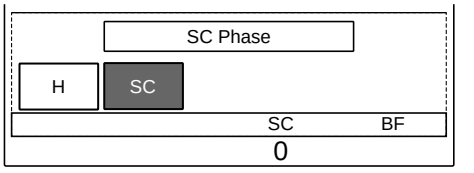
1. Set the REMOTE/LOCAL switch on the VA board of the CCU to REMOTE.
2. Press the MAINTENANCE button in the MODE block of the MSU-700/750.
   The Maintenance Menu appears.



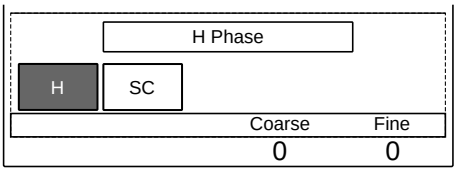
3. Press [Adjusting].
   The Maintenance adjusting item menu appears.



4. Press [Phase] to set it in inverse video.
   The lower half of the display becomes the Phase control display. There are two Phase control displays for SC and H, which can be selected on the submenu.
5. Press [SC] to set it in inverse video to turn on SC Phase control mode.
   The lower half of the display becomes the SC Phase display.



6. Adjust the phase of SC with the control knob.
   SC: To adjust the SC phase
7. Press [H] to set it in inverse video to turn on H Phase control mode.
   The lower half of the display becomes the H Phase display.



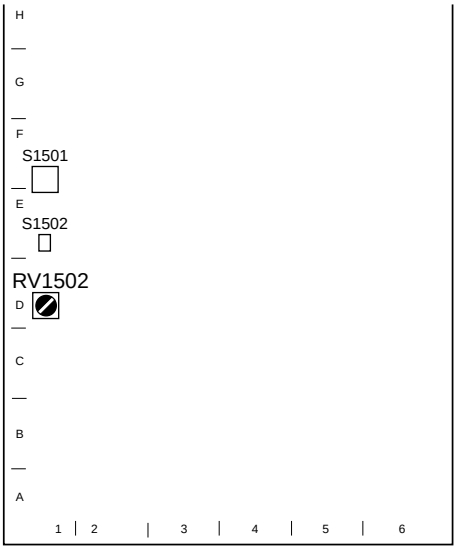
8. Adjust the phase with two control knobs.
   Coarse: To roughly adjust the H phase
   Fine: To precisely adjust the H phase and SC-H phase

To terminate the adjustment

Press the MAINTENANCE button to turn it dark

Adjusting the phases of the camera signals

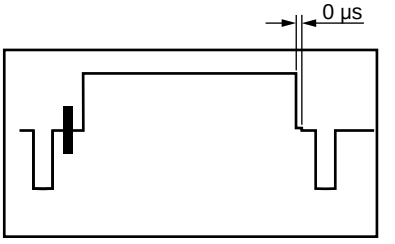
Adjust the phases of the blanking section of camera and the blanking section of CCU so that they are identical. The phases are adjusted at the factory.



VA-175 board

1. Close the iris on the lens.
2. Set the master black level of the camera to the maximum value (99).
3. Monitoring the VBS signal, turn RV1502 (CHU PHASE) on the VA-175 board so that the blanking period of the camera signal disappears from the monitor screen.

Test point: VBS 1 OUT/CCU rear panel

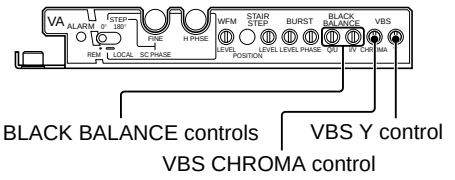


4. Reset the master black level of the camera to 0.

2-3-4. Adjusting the VBS Signal Level

Adjust the level of the VBS signal output from the VBS connector of the unit using a color-bar signal.

VA board

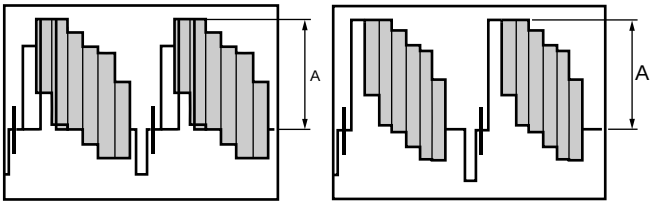


1. Press the BARS button on the MSU-700/750, RCP-700 series, etc. to display the color-bar signal on a waveform monitor or vectorscope.
2. Adjust the color-bar signal with the VBS Y and VBS CHROMA controls on the panel of the VA board so that the signal meets the specified level.

Test points: VBS 1 OUT connector/CCU rear panel
Specifications: A = 100 ±1 IRE (for NTSC)
A = 700 ±7 mV (for PAL)

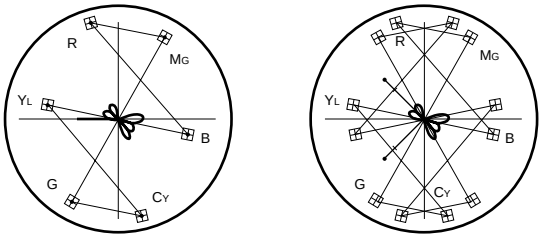
Specifications:

[For NTSC] **[For PAL]**



The beam spots for each color shall be positioned inside the corresponding frame ⊞ on the vectorscope.

[For NTSC] **[For PAL]**



Note

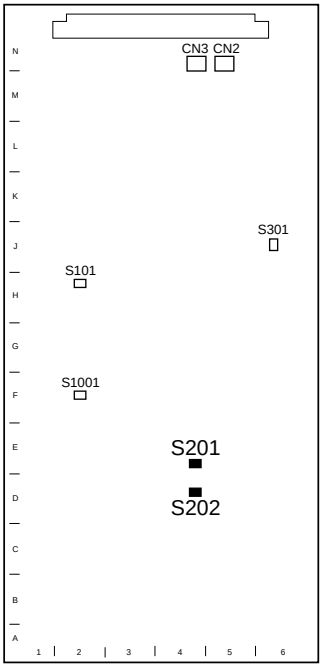
When the beam spot showing the black level is remarkably deviated from the center of the vectorscope, adjust the BLACK BALANCE controls (I/V, Q/V) on the panel of the VA board so that the beam spot is centered.

2-3-5. Adjusting the Triax Signal

When the adjustment of the VBS signal level of the unit is finished, adjust the triax signal.

Setting the cable compensation

Set the cable compensation according to the length of the triax cable connecting the camera and CCU. Automatic compensation is set at the factory.
To adjust the cable-length compensation manually, proceed as follows.



DM-110 board

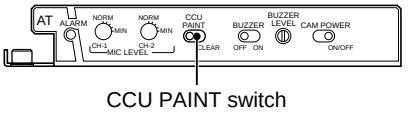
1. Set the switch S201 (MODE) on the DM-110 board to MANU.
2. Set the switch S202 (CABLE LENGTH) on the DM-110 board to the appropriate position according to the cable length as shown below.

Cable length			Switch setting
FUJIKURA ø8.5	**FUJIKURA ø14.5**	**Belden 9238**	
120 m (394 feet)	240 m (787 feet)	180 m (591 feet)	1
360 m (1,181 feet)	720 m (2,362 feet)	540 m (1,772 feet)	2
600 m (1,969 feet)	1200 m (3,937 feet)	900 m (2,953 feet)	3

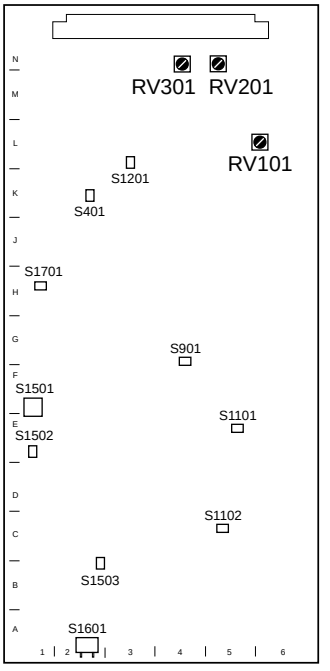
http://getMANUAL.com

Adjusting the black level of the camera signal

AT board



CCU PAINT switch

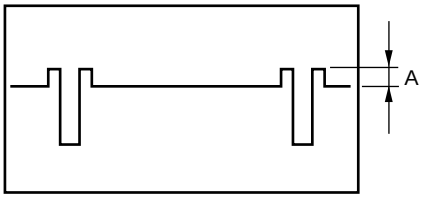


VA-175 board

1. Close the iris on the lens.
2. Set the master black level of the camera to the minimum value (−99).
3. Set the CCU PAINT switch on the panel of the AT-111 board to CLEAR.
   The center value of the adjustable range is retrieved.
4. Adjust the levels with the following controls on the VA-175 board.
   RV101 (Y BLK): To adjust the black level of the Y signal sent from the camera
   RV201 (R-Y BLK): To adjust the black level of the R-Y signal sent from the camera
   RV301 (B-Y BLK): To adjust the black level of the B-Y signal sent from the camera

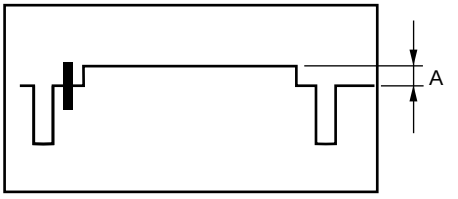
Test point: TP23 (GND: TP22) /
Extention board (for NTSC)
Specifications: A = 0 ± 1 IRE (for NTSC)

Y:



Test point: VBS 1 OUT connector/CCU rear panel
Specifications: A = 0 ± 7 mV (for PAL)

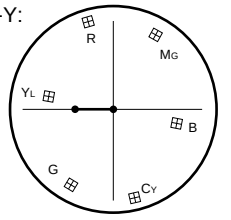
Y:

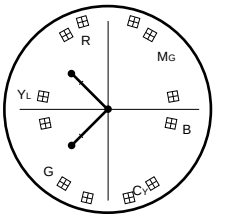


Specifications:
Adjust so that the beam spot of black level is located in center of the vectorscope.

[For NTSC] **[For PAL]**

R-Y, B-Y:



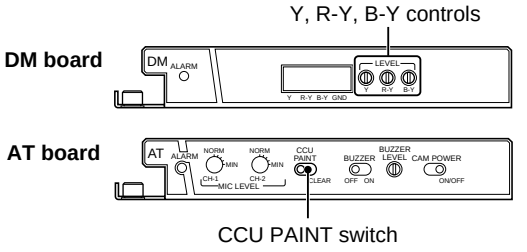


5. Reset the master black level of the camera to 0.

Adjusting the level of the camera signal

Supply a camera signal from the VBS connector of the unit and the color-bar signal from the camera. Then adjust the level of the camera signal with the controls on the DM board so that it matches the level of the color-bar signal. To supply the color-bar signal, set the CB on the VTR/CCU page of the System Config Menu to ON.

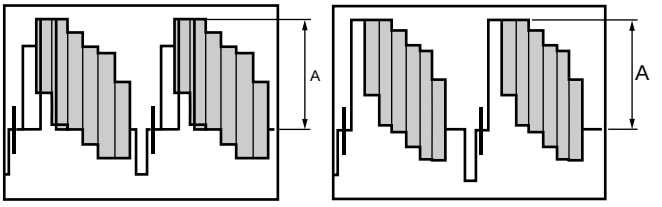
- For details on supplying the color-bar signal, see the maintenance manual of camera.



1. Set the CCU PAINT switch on the panel of the AT board to CLEAR.
   The center value of the adjustable range is retrieved.
2. Adjust the Y signal level with the Y control on the DM board as shown below.

Test point: VBS 1 OUT connector/CCU rear panel
Specifications: A = 100 ±1 IRE (for NTSC)
A = 700 ±7 mV (for PAL)

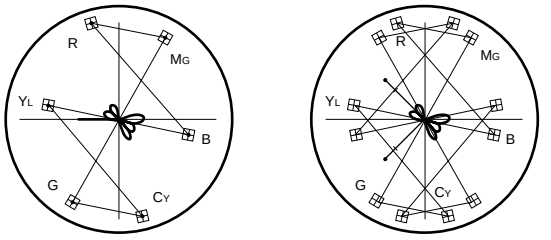
[For NTSC] **[For PAL]**



3. Adjust the B-Y and R-Y signal levels with the B-Y and R-Y controls on the DM board as shown below.

Specifications: The beam spots for each color shall be positioned inside the corresponding frame ⊞ on the vectorscope.

[For NTSC] **[For PAL]**

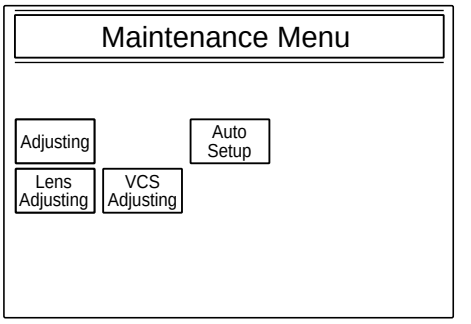


After the adjustments completed, set the CB on the VTR/CCU page of the System Config Menu to OFF.

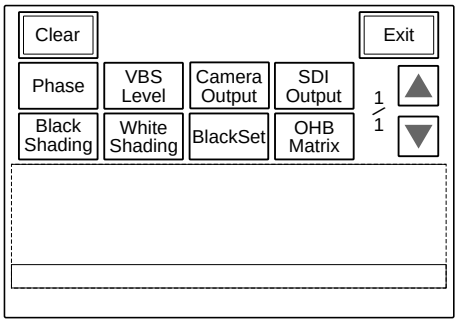
Adjusting the level and the black level of the camera signal using the MSU-700/750

The level and black level of the camera signal can be adjusted using the maintenance menu of the MSU-700/750.

1. Close the iris on the lens.
2. Set the master black level of the camera to the minimum value (−99).
3. Press the MAINTENANCE button in the MODE block of the MSU-700/750.
   The Maintenance Menu appears.

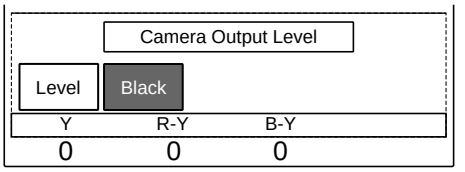


4. Press [Adjusting].
   The Maintenance adjusting item menu appears.

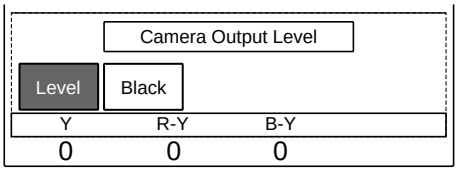


5. Press [Camera Output] to set it in inverse video to turn on Camera Output Level mode.
   The lower half of the display becomes the Camera Output Level display.
   There are two Camera Output Level displays, Level and Black, which can be selected on the submenu.

6. Press [Black] to set it in inverse video to turn on Black control mode.
   The lower half of the display becomes the Black control display.



7. Adjust the signal levels with the three left control knobs.
   - Y: To adjust the black level of the Y signal sent from the camera
   - R-Y: To adjust the black level of the R-Y signal sent from the camera
   - B-Y: To adjust the black level of the B-Y signal sent from the camera
8. Reset the master black level of the camera to 0.
9. Press BARS button to display the color-bar signal on the waveform monitor and the vectorscope.
10. Press [Level] on the sub menu to set it in inverse video to turn on Level control mode.
    The lower half of the display becomes the Level control display.



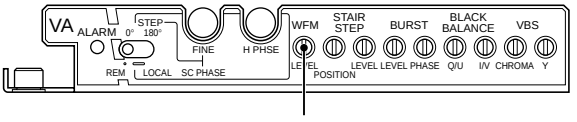
11. Adjust the following levels using the control knobs corresponding to the displayed items.
    - Y: To adjust the Y signal level sent from the camera.
    - R-Y: To adjust the R-Y signal level sent from the camera.
    - B-Y: To adjust the B-Y signal level sent from the camera.

2-3-6. Adjusting the Level of the Signals on a Waveform Monitor

The video output signal of this unit can be checked using waveform monitor connected to the WF output connector. Adjust the level of the WF output signal using the color-bar signal.
For the system consisting of MSU-700/750, CNU-700/500 and VCS-700, the video output signal of this unit can be checked using the waveform monitor connected to the VCS-700.
For more detail, see the system manual or the maintenance manual of VCS-700.

Adjusting the level of the WF output siganal

VA board

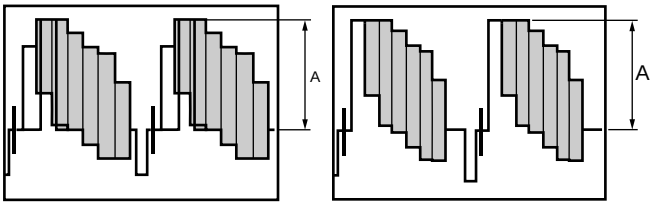


WFM LEVEL control

1. To display the color-bar signal on the waveform monitor, push the BARS button on the MSU-700/750, RCP-740/741, etc., and push the ENC button of the WAVEFORM MONITOR (or MONITOR SELECT) button.
2. Adjust the color-bar level to the specified level using the WFM LEVEL control on the VA board.

Test point: WF OUT connector/CCU rear panel
Specifications: A = 100 ±1 IRE (for NTSC)
A = 700 ±7 mV (for PAL)

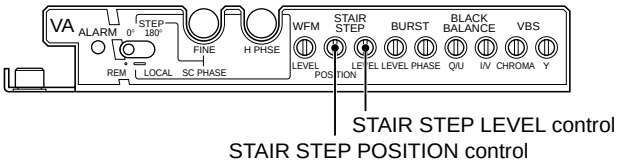
[For NTSC] **[For PAL]**



Adjusting the staircase signal

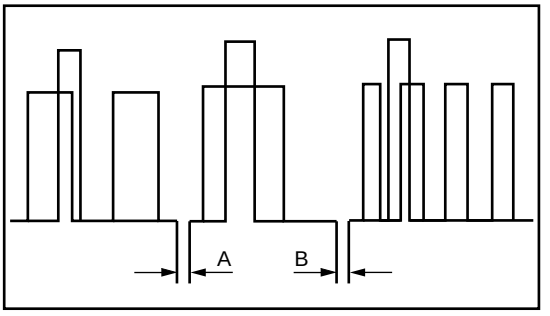
Adjust the staircase signal for displaying the signal on the waveform monitor screen in sequential mode. This adjustment is necessary only when the signal in sequential mode does not appear on the waveform monitor correctly. When the waveform monitor is connected to this unit, use the controls on the VA board of this unit, and when the monitor is connected to the VCS-700, see the maintenance manual of VCS-700.

VA board



1. Press the SEQ button of the WAVEFORM MONITOR (or MONITOR SELECT) buttons of the MSU-700/750 or the RCP-740/741 etc..
2. Adjust the interval of the signals displayed on the monitor screen with the STAIR STEP POSITION control.
3. Adjust the intervals of A and B are equal by the STAIR STEP LEVEL control.

The waveform-monitor control signal is output from this unit synchronizing with the output signal of the WF output connector when the SEQ button of the WAVEFORM MONITOR (or MONITOR SELECT) buttons of the MSU-700/750, RCP-740/741, etc. is pressed.

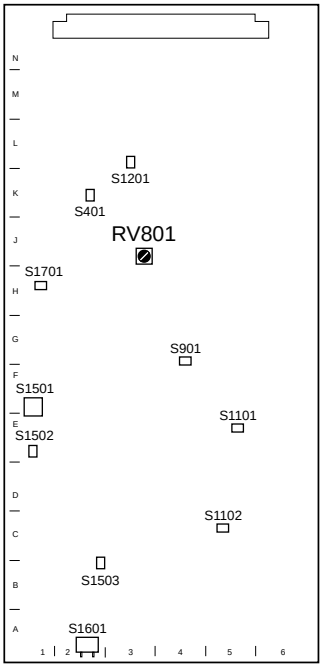


Note

Control of sequential mode depends on the waveform monitor. If necessary, reverse the porarity of the control signal by the switch S901 (SEQ ON) on the VA board. If the adjustment is impossible with the porarity reversed, adjust on the waveform monitor.

2-3-7. Adjusting the Level of the Signals on a Picture Monitor

The video output signal can be checked by the picture monitor connected to the PIX OUT connector. Adjust the level of PIX output signal using a color-bar signal.
For the system consisting of MSU-700/750, CNU-700/500 and VCS-700, the video output signal of this unit can be checked using the picture monitor connected to the VCS-700.
For more details, see the system manual or the maintenance manual of the VCS-700.

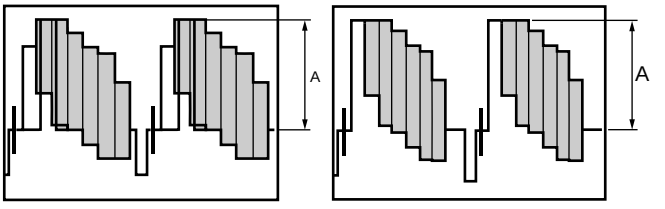


VA-175 board

1. To display the color-bar signal on the waveform monitor, push the BARS button on the MSU-700/750, RCP-740/741, etc., then push the ENC button of the PICTURE MONITOR (or MONITOR SELECT) button.
2. Adjust the color-bar level to the specified level using the PIX VIDEO control RV801 on the VA board.

Test point: PIX OUT connector/CCU rear panel
Specifications: A = 100 ± 1 IRE (for NTSC)
A = 700 ± 7 mV (for PAL)

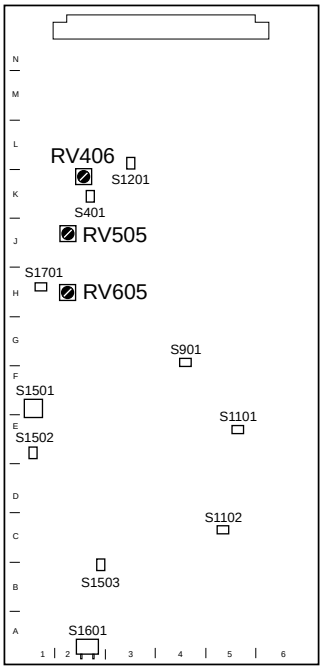
[For NTSC] **[For PAL]**



2-3-8. Adjusting the Y•R-Y•B-Y/RGB Signal Level

Adjust the level of the component signal (Y•R-Y•B-Y) or the RGB signal for chroma key function by the Y•R-Y•B-Y/RGB switch S401 on the VA-board using a color-bar signal.

1. To display the color-bar signal on the waveform monitor, push the BARS button on the MSU-700/750 or RCP-700/701, etc.
2. Adjust the color-bar signal level to the specified level using Y/G LEVEL control RV406, R-Y/R LEVEL control RV505 and B-Y/B LEVEL control RV605 on the VA board.

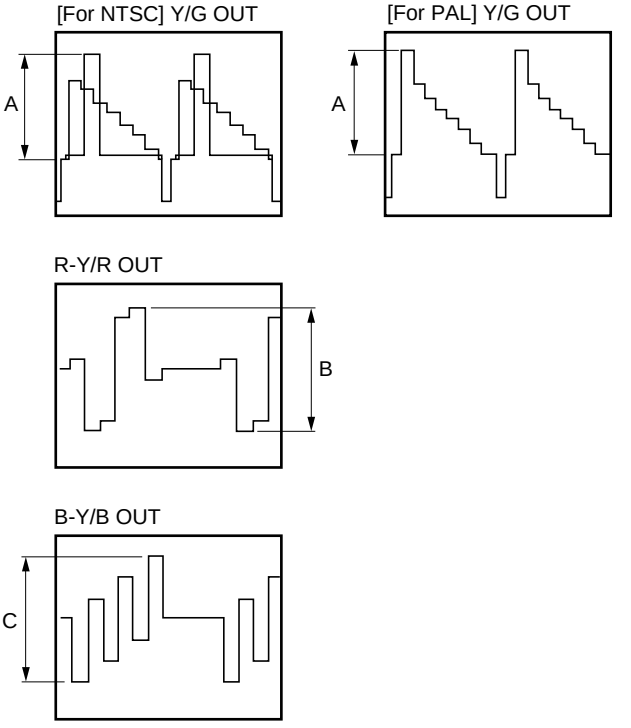


VA-175 board

When S401 = "Y•R-Y•B-Y"

Test point/ Rear panel	Adj. Point	Specifications
Y/G OUT	RV406	A = 100 ±1 IRE (for NTSC) A = 700 ±7 mV (for PAL)
R-Y/R OUT	RV505	B = 700 ±5 mV p-p (for NTSC) B = 525 ±5 mV p-p (for PAL)
B-Y/B OUT	RV605	C = 700 ±5 mV p-p (for NTSC) C = 525 ±5 mV p-p (for PAL)

When S401 = "Y•R-Y•B-Y"

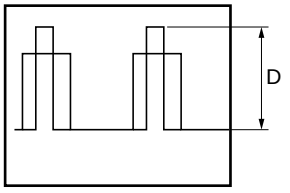


When S401 = “RGB”

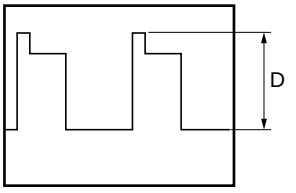
Test point/ Rear panel	Adj. Point	Specifications
Y/G OUT	RV406	D = 700 ±7 mV
R-Y/R OUT	RV505	
B-Y/B OUT	RV605	

When S401 = “RGB”

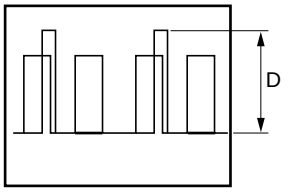
[For NTSC] Y/G OUT



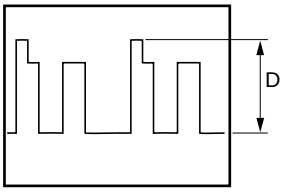
[For PAL] Y/G OUT



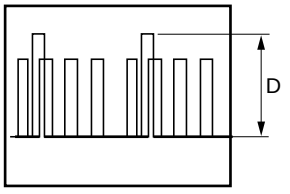
[For NTSC] R-Y/R OUT



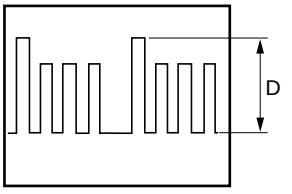
[For PAL] R-Y/R OUT



[For NTSC] B-Y/B OUT



[For PAL] B-Y/B OUT



2-3-9. Adjusting the Signal of the Optional Boards

For adjusting the signal of the optional board (AD board/ BKP-5972), see the maintenance manual of BKP-5972.

2-3-10. When Adjustments are Finished

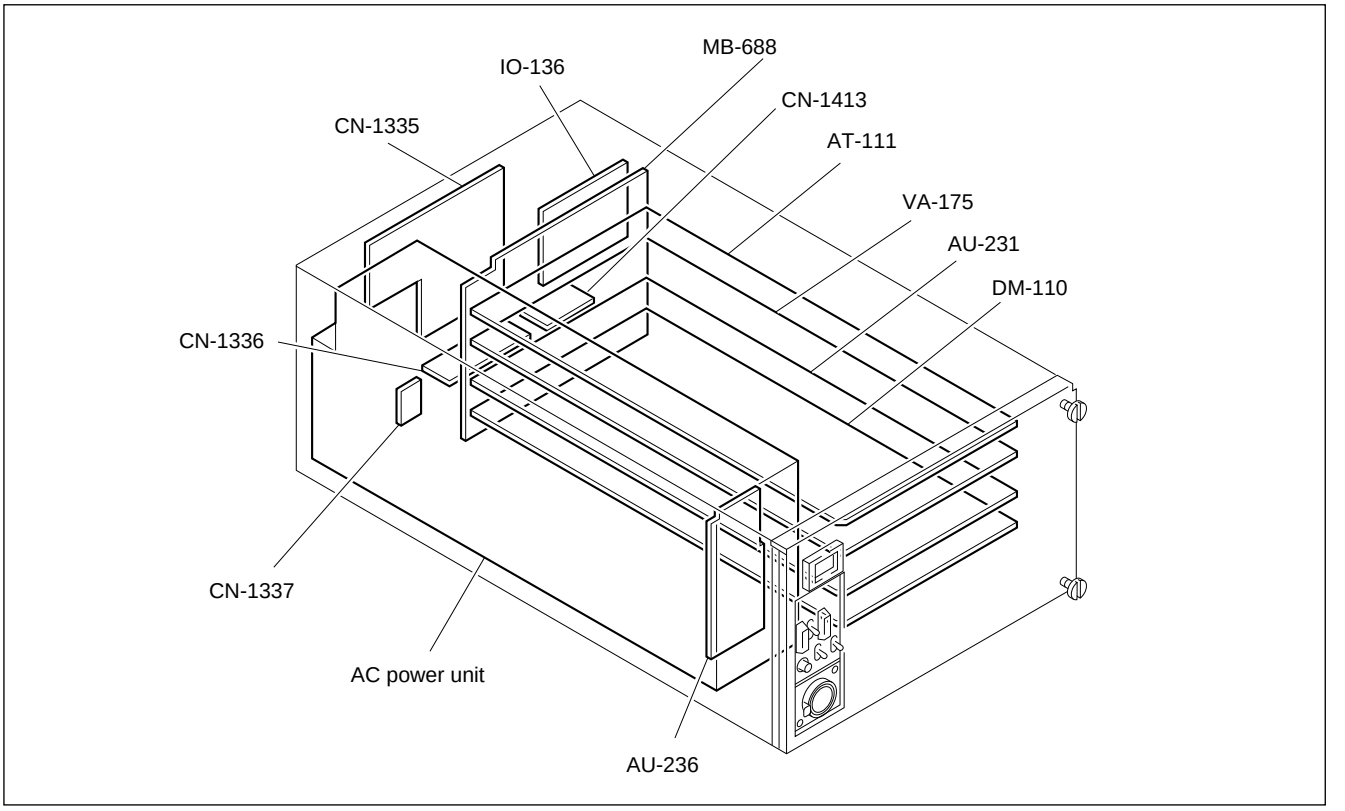
When adjustments mentioned in Sections 2-3-3 through 2-3-9 are finished, set the switches of the CCU-550A/ 550AP as follows:

- REMOTE/LOCAL switch/VA board → REMOTE
- CCU PAINT switch/AT board → Opposite position of CLEAR

If the CCU-550A/550AP is used alone, do not reset the REMOTE/LOCAL switch on the VA board to REMOTE.

Section 3
Service Overview

3-1. Board Layout



3-2. Circuit Description

- **AT-111 board**
  This board sends or receives the control data between the camera and CCU, and RCP, CNU, and CCU, controls the input/output signals on each board of this unit, and controls each tally signal. This board also sends or receives the control data to or from the BKP-5973 (CCU control panel).

- **VA-175 board**
  This board produces VBS and RGB signals from the Y, R-Y, and B-Y signals sent from the DM-110 board, switches these signals, and outputs them as WF and PIX signals. This board also generates each sync signal and color bars signal.

- **AU-231 board**
  This board demodulates the MIC RF signal sent from the camera, modulates a PGM signal, modulates and demodulates the INCOM signal and control data between the camera and CCU, and switches the INCOM line.

- **DM-110 board**
  This board demodulates the Y RF signal sent from the camera to produce a Y signal and demodulates a chroma signal RF signal to produce R-Y and B-Y signals. This board also modulates the video signals input to the RET and PROMPT connectors on the rear panel and sends them to the camera.

- **AU-236 board**
  This board inputs and outputs an INCOM signal on the front panel, displays a tally signal, and turns on and off the power of this unit and camera.

- **IO-136 board**
  This board mixes the RF signal between the camera and CCU with the power of the camera.

- **AC power unit**
  This board supplies the power to the camera and supplies the power to each board of this unit.

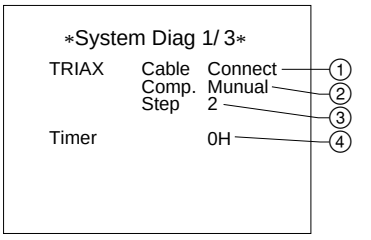
3-3. Self-diagnosis Function

The CCU-550A/550AP has an internal character generator circuit and can display the state of the CCU-550A/550AP on the monitor as character information. To display the state on the monitor, the character information is mixed with a video signal and output from the PIX connector. The contents of the display can be changed by pressing the CHARACTER button of RCP-700 series.
The state of the CCU-550A/550AP is displayed when you press the CHARACTER button of the RCP to turn on it. The displayed page changes every time the CHARACTER button is pressed. The page continuously changes when the button is pressed continuously. The button goes off after all the pages are displayed.

・ Self-diagnosis of the camera system

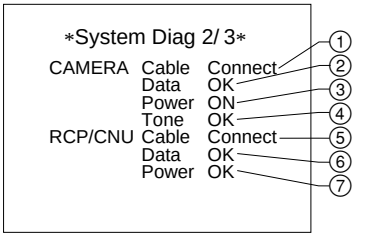
The self-diagnosis of the camera system consists of three pages. Page 1 of the self-diagnosis display appears when you press the CHARACTER button of RCP-700 series to turn on it. Press the CHARACTER button again. Pages 2 and 3 are then displayed sequentially.

Page 1 of the camera system's self-diagnosis display



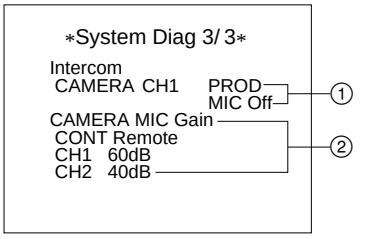
① Connection of triax cable (connect/open)
② Selection of triax cable compensation (auto/manual)
③ Cable length of triax cable (step indication in the circuit)
④ Current conduction time to the AT board

Page 2 of the camera system's self-diagnosis display



① Connection of camera cable
② Data from the camera
③ Power state of the camera
④ Identification tone state of the camera
⑤ Connection of cable to the RCP/CNU connector
⑥ Data from the RCP/CNU connector
⑦ Power of the RCP/CNU connector

Page 3 of the camera system's self-diagnosis display

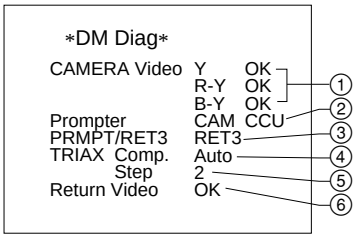


① Intercom state of the camera (producer line/engineer line)
② Gain and control state of the microphone circuit of the camera

- **Self-diagnosis of the internal board of the CCU-550A/550AP**

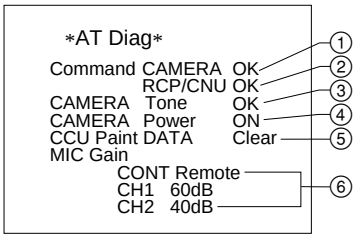
The self-diagnosis result of the DM board of the CCU-550A/550AP is displayed when you press the CHARACTER button of RCP-700 series with page 3 of the self-diagnosis display of the camera system displayed. Press the CHARACTER button again. The diagnosis results of each board are then displayed sequentially. If a trouble occurs during self-diagnosis, press the CHARACTER button. The display for the board on which the trouble occurred then appears.

DM board



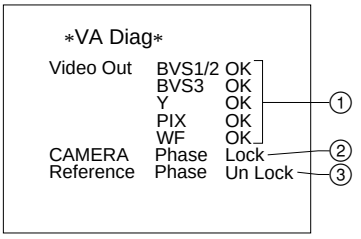
① State of Y, R-Y, and B-Y signals of triax signal
② Transmission state of prompter
③ Selection of prompter signal (PRMPT/RET3)
④ Selection of triax cable compensation (auto/manual)
⑤ Cable length of triax cable (step indication in the circuit)
⑥ State of return video signal

AT board



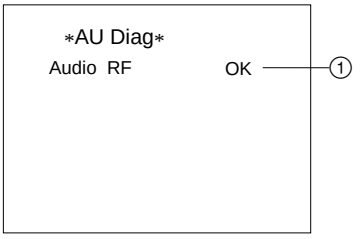
① Connection of commands to the CAMERA connector
② Connection of commands to the RCP/CNU connector
③ Check of identification tone from the camera
④ Power state of the camera
⑤ ON/OFF of analog control preset on the panel of the AT board of the CCU-550A/550AP
⑥ Gain and control state of the microphone circuit of the camera

VA board



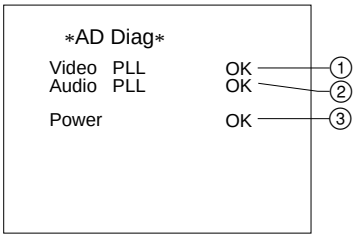
① Video signal output state of each video output connector
② Locking state of the H phase between the camera and CCU-550A/550AP
③ Locking state of the CCU-550A/550AP with the input reference signal

AU board



① Triax PF signal state output from the AU board

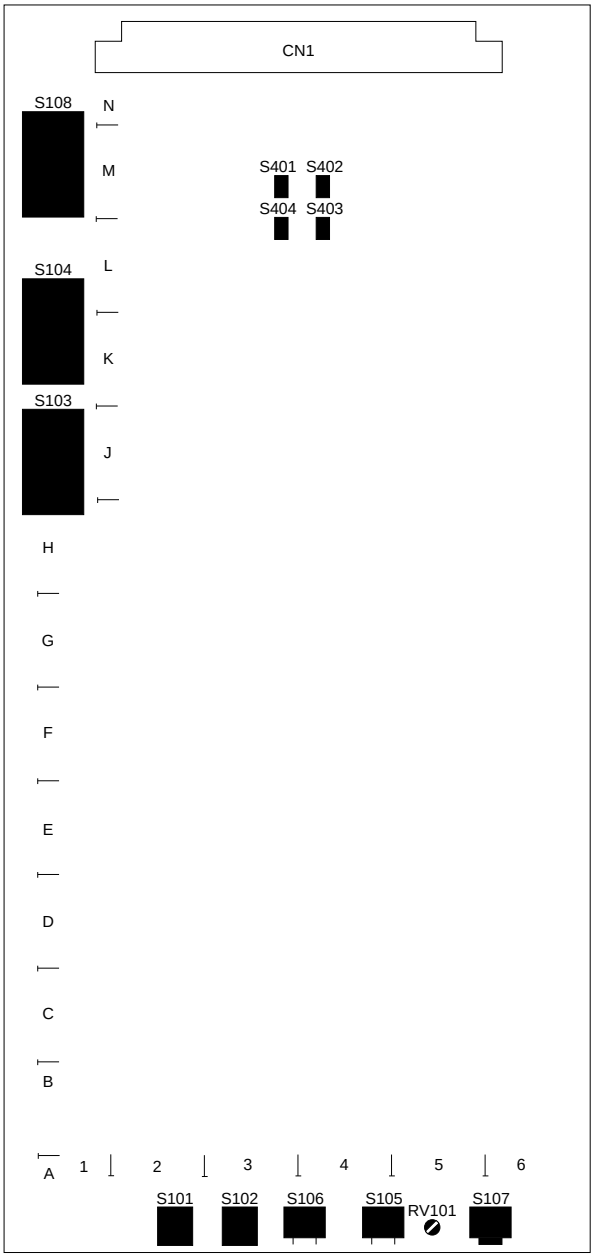
AD board (Option : BKP-5972)



① Locking state of the video serial clock with the video parallel clock
(OK: Lock, NG: Unlock)
② Locking state of the audio clock with the video parallel clock
(OK: Lock, NG: Unlock)
③ Check of the board power

3-4. Functions of Switches on Board

AT-111 board



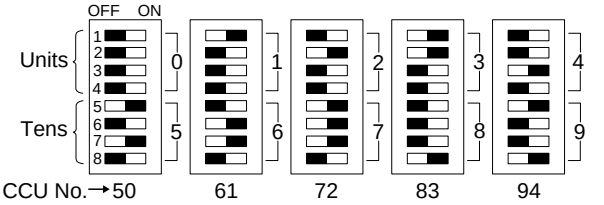
- S101 (MIC 1, GAIN)
- S102 (MIC 2, GAIN)

These switches are used to select the MIC 1/2 amplifier gain of the camera head by this unit. The gain is set to 60 dBu (NORM), 50 dBu, 40 dBu, 30 dBu, or 20 dBu (MIN) according to the microphone sensitivity and volume condition during shooting.
Factory setting: [NORM](60 dBu)(0 dBu = 0.775 Vrms)

- S103 (CCU No.)

This switch is mainly used to set the CCU number.
The CCU number of 1 to 96 can be set in binary coded decimal (BCD) using switches 1 to 8 of S103. The switches 1 to 4 determine the number of units and 5 to 8 determaine the number of tens. For each digit, the number of 0 to f can be assigned. However, the number of a to f becomes invalid.

(Example)



Factory setting: All OFF

- S104-1

Not used.
Factory setting: OFF

S104-2 (EXT REF LOCK CAUTION ON/OFF)
When no reference signal is input to CCU, alarm indicator is lit or alarm message is displayed on MSU, RCP or CNU normaly. This switch selects whether the alarm indication is performed with no reference signal input, or not.
With the switch set to ON, the alarm indication is not performed.
Factory setting: OFF

S104-3
This switch sets the output signal of the CCU when the camera power is turned off.
ON: Color bars signal output
OFF: Muting
Factory setting: OFF

http://getMANUAL.com

S104-4
This switch sets the control system of PIX and WF connector outputs.
ON: Controls the PIX and WF by MSU only.
OFF: Controls the PIX and WF simultaneously by MSU or RCP.
Factory setting: OFF

S104-5 Unused
S104-6 Unused
S104-7 Unused
Factory setting: OFF

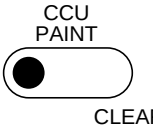
S104-8 (CONTROL CLEAR)
When the CCU power is turned on with this switch set to ON, all analog control data is returned to the center value, and the switch data is returned to the factory-setting value.

Note

- This switch setting is valid only when the CCU number set by S103 is less than 96.
- When switches 1 to 8 of S103 are all set to ON with S104-8 set to ON, the hour meter data memorized in the microcomputer on the AT board is reset.
- When switches 2 to 8 of S103 are set to ON with S104 8 set to ON, the character signal set by the user is erased.

Factory setting: OFF

- S106 (CCU PAINT CLEAR)
  The control item that can be changed in the CCU is fixed to the center value when this switch is set to CLEAR.



- S401 (R TALLY POWER/CONTACT)
- S404 (R TALLY POWER/TTL)

These switches are set according to the signal standard of the R TALLY signal input to the INTERCOM/TALLY/PGM connector on the rear panel. For the relation between the signal and switch setting, refer to the table below.
Factory setting: POWER

- S402 (G TALLY POWER/CONTACT)

- S403 (G TALLY POWER/TTL)
  These switches are set according to the signal standard of the G TALLY signal input to the INTERCOM/TALLY/PGM connector on the rear panel. For the relation between the signal and switch setting, refer to the table below.
  Factory setting: POWER

Settings for the tally system

	Red tally		Green tally	
Switches	**S401**	**S404**	**S402**	**S403**
Contact supply	CONTACT	—	CONTACT	—
24 V power supply	POWER	POWER	POWER	POWER
5 V power supply	POWER	TTL	POWER	TTL

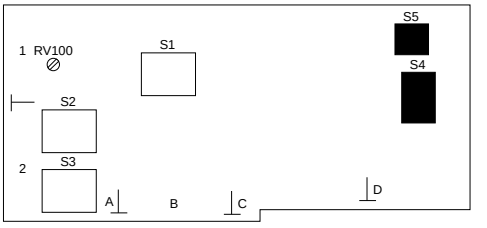
- S105 (BUZZER)
  This switch is set to OFF when no buzzer is used.
  Factory setting: OFF

- RV101 (BUZZER VOLUME)
  This switch is used to adjust the buzzer volume.
  Factory setting: MAX

- S107 (CAMERA POWER)
  This toggle switch is set to OFF when the power of the camera head is turned on. It is set to ON when the power of the camera head is turned off.

- S108-1 to S108-8 Unused.
  Factory setting: OFF

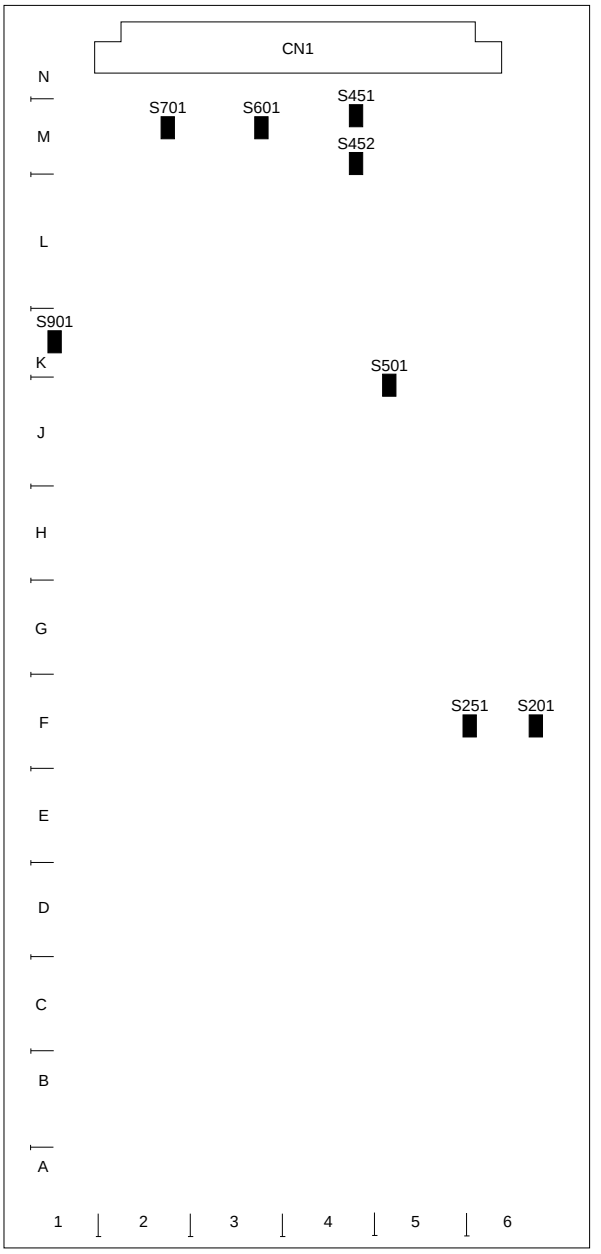
AT-236 board



- S4 (DYN/CM)
  This switch is set according to the type of the headset microphone connected to the INTERCOM connector on the front panel.
  DYN : DYNAMIC MIC
  CM : CARBON MIC
  Factory setting: CM

- S5 (OPEN/GND)
  This switch selects balanced or unbalanced input for the intercom mic when dynamic mic headset is connected to the INTERCOM connector.
  OPEN : BALANCE
  GND : UNBALANCE
  Factory setting: OPEN

AU-231 board



- S601 (INCOM PROD SELECT)
  This switch selects the intercom system of a producer line.
  4W: 4-wire system
  RTS: RTS system
  Factory setting: 4W

- S701 (INCOM ENG SELECT)
  This switch selects the intercom system of an engineer line.
  4W: 4-wire system
  RTS: RTS system
  Factory setting: 4W

- S451 (PGM IN)
  This switch sets the PGM (program audio) level to 0 dBu or -20 dBu.
  Factory setting: 0 dBu

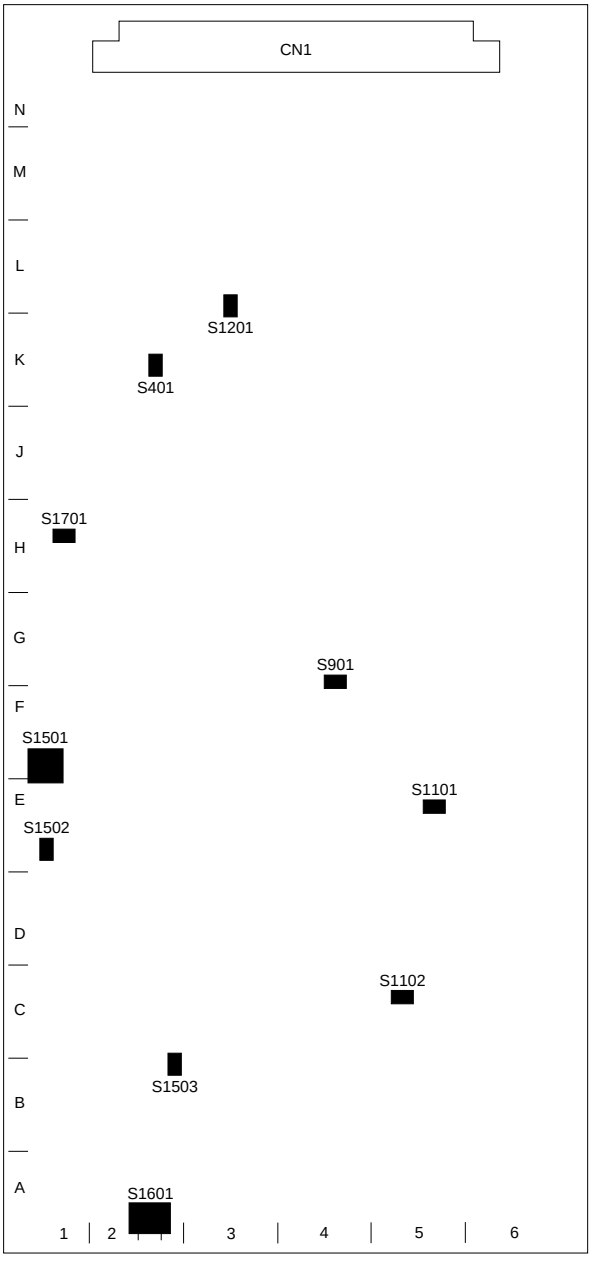
- S901 (INPUT SELECT)
  This switch is set to 1CH (PROD) or 2CH (PROD, ENG) according to the intercom system. This switch is fixed to PROD irrespective of the ENG/PRD selector switch setting on the camera and CCU sides when it is set to 1CH.
  Factory setting: 2CH

- S501 (PGM MIX)
  This switch selects whether to mix the program audio with the intercom audio or output the intercom audio and program audio separately to the right and left channels.
  MIX: Mixes the intercom audio and program audio.
  SEP: Outputs the intercom audio and program audio separately to the right and left channels.
  MIX: Does not mix the program audio with the intercom audio.
  Factory setting: OFF

- S201 (MIC1 IN)
  This switch sets the audio signal level of the MIC OUTPUT CH-1 connector on the rear panel to 0 dBu or -20 dBu.
  Factory setting: 0 dBu

- S251 (MIC2 IN)
  This switch sets the audio signal level of the MIC OUTPUT CH-2 connector on the rear panel to 0 dBu or -20 dBu.
  Factory setting: 0 dBu

VA-175 board



- S901 (SEQ ON +/−)
  Select this switch to + or - according to the waveform monitor to be used.
  +: NPN open collector output
  −: PNP open collector output
  Factory setting: −

- S1101 (I/V ON/OFF)
  This switch is used for encoder circuit adjustment. When this switch is set to OFF, no I/V signal is contained in the composite video (VB or VBS) signal that this unit outputs because an I/V signal is not input to the chroma circuit (double-balanced circuit).
  Factory setting: ON

- S1102 (Q/U ON/OFF)
  This switch is used for encoder circuit adjustment. When this switch is set to OFF, no Q/U signal is contained in the composite video (VB or VBS) signal that this unit outputs because a Q/U signal is not input to the chroma circuit (double-balanced circuit).
  Factory setting: ON

- S1501 (H BLKG)
  This switch is used for H blanking width adjustment. During factory setting, this switch is set so that the H blanking width is 10.9 ±0.2 µsec for CCU-550A and 12.0 ±0.2 µsec for CCU-550AP. Set this switch according to the application.

- S1502 (V BLKG 19H/20H/21H) (CCU-550A only)
  This switch sets the V blanking width to 19H, 20H, or 21H. Set this switch according to the application.
  Factory setting: 20H

- S1601 (REMOTE/LOCAL (0°)/LOCAL (180°))
  This switch selects whether to control the alignment of H•SC phase with an external genlock signal by a master setup unit (MUS-700/750) or this unit. The alignment of the H.SC phase can be controlled using RV1601 and RV1604 on the VA board when this switch is set to LOCAL.
  Set this switch to LOCAL when the remote control panel RCP series or remote control unit RM-B150 without H.SC phase control are connected to this unit. The SC phase can be selected to 180˚when this switch is set to LOCAL (0˚) and LOCAL (180˚).
  Factory setting: REMOTE

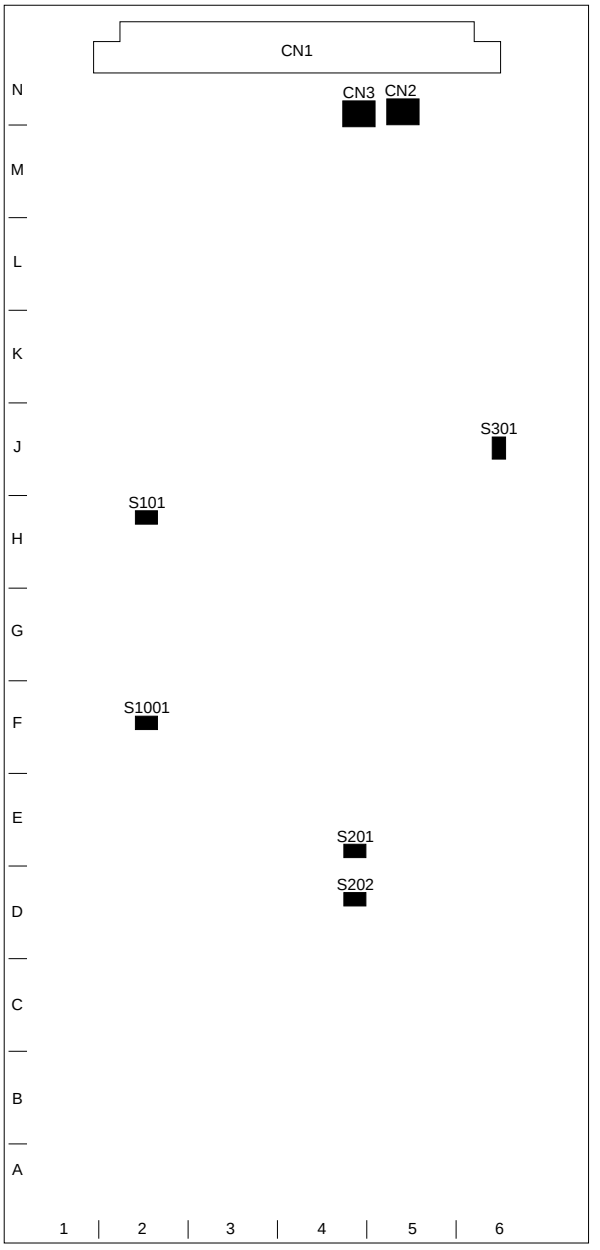
- S1701 (CB SELECT)
  This switch sets the color bars signal output by this unit to SMPTE, EIAJ, or FULL for CCU-550A, to EBU or 95 % for CCU-550AP. Set this switch according to the application.
  Factory setting: SMPTE for CCU-550A
  EBU for CCU-550AP

- S1503 (VCO ON/OFF)
  To free run the VCO oscillation, set this switch to OFF.
  Factory setting: ON

- S401 (Y•R-Y•B-Y/RGB)
  This selects the signals of the Y/G, R-Y/R, and B-Y/B OUT connectors on the rear panel.
  Factory setting: Y/R-Y/B-Y

- S1201 (VBS3/SYNC)
  This switch selects the signal of the VBS3 OUT connector on the rear panel.
  Factory setting: VBS3

DM-110 board



- S201 (MODE AUTO/MANU)
  The length of a triax cable connecting the camera head and CCU is automatically detected and set when this switch is set to AUTO. The triax cable length can be manually set using S202 (CABLE LENGTH SELECT) when this switch is set to MANU (MANUAL).
  Factory setting: AUTO

- S202 (CABLE LENGTH SELECT)
  This switch is valid when S201 is set to MANU. This switch is set to the number corresponding to the cable length.
  Factory setting: 1 (120 m)

Switch setting	Cable length (center value)
1	120 m
2	360 m
3	600 m

- S101 (Y-ch 2nd AGC ON/OFF)
- S301 (CHROMA-ch 2nd AGC ON/OFF)
  These switches are used for RF AGC adjustment. Usually, set these switches to ON.

  S1001 (PROMPT SELECT RET3/PROMPT)
  This switch sets the connection destination of a signal input to the PROMPTER/RET3 connector (BNC) on the rear panel.
  RET3: Connected to the RET3 selection circuit.
  PROMPT: Connected to the prompter transmission circuit.
  Factory setting: PROMPT

3-5. Adjusting/Setting Items after Board Replacement

After the lithium battery on the AT-111 board replacement or the plug-in board replacement, be sure to perform the following adjustment and setting.

3-5-1. When the AT-111 Board Had Been Replaced.

Adjusting/Setting

2-1-2. Setting the Program Microphone Signal
- Control the microphone input level remotely.
- Adjustment with MIC LEVEL switch

2-2-1. Setting for the Tally System

2-2-2. Setting the Camera Numbers
- Set the camera number to the system which the CNU-700/500 is not in use.

Buzzer on/off setting and level adjustment
(Refer to section 3-4. Function of Switches Inside the Board.)

2-3-3. Adjusting the Phases of the Signals
- Adjust the phase of sync signal.
- How to adjust with MSU-700/750

2-3-5. Adjusting the Triax Signal
- Adjust the camera signal level and the black level with MSU-700/750.

3-5-2. When the Lithium Battery on the AT-111 Board Had Been Replaced

Adjusting/Setting

2-3-3. Adjusting the Phases of the Signals
- Adjust the phase of sync signal.
- How to adjust with MSU-700/750

2-3-5. Adjusting the Triax Signal
- Adjust the camera signal level and the black level with MSU-700/750.

When the BKP-5972 (AD-130 Board) Had been installed.
Adjust the following items with MSU-700/750.
- SDI Y Black Adjustment
- SDI R-Y/B-Y Black Adjustment
- SDI Y Level Adjustment
- SDI R-Y/B-Y Level Adjustment

Regarding above adjustments, see “Option Board Signal Adjustment” of system manual or maintenance manual of BKP-5972.

3-5-3. When the VA-175 Board Had Been Replaced

Adjusting/Setting

2-3-1. Selecting the Input/Output Signal
- VBS3/SYNC and Y•R-Y•B-Y/RGB Switches Setting

2-3-3. Adjusting the Phases of the Signals
- Adjust the phase of sync signal.
- Adjust the camera phase.

2-3-5. Adjusting the Triax Signal
- Adjust the black level of the camera signal.
- Adjust the camera signal level.
- Adjust the camera signal level and the black level with MSU-700/750.

2-3-6. Adjusting the Level of the Signal on a Wavefrom Monitor
- Adjust the stair-case signal.

Perform the following adjustment as the need arises.

2-3-4. Adjusting the VBS Signal Level

2-3-6. Adjusting the Level of the Signal on a Wavefrom Monitor
- Adjust the level of waveform signal.

2-3-7. Adjusting the Picture Monitor Signal Level

2-3-8. Adjusting the Y•R-Y•B-Y/RGB Signal Level

When the BKP-5972 (AD-130 Board) Had been replaced.
- SDI Video Phase Adjustment
- SDI Y Black Adjustment
- SDI R-Y/B-Y Black Adjustment
- SDI Y Level Adjustment
- SDI R-Y/B-Y Level Adjustment

Regarding above adjustments, see “Option Board Signal Adjustment” of system manual or maintenance manual of BKP-5972.

3-5-4. When the AU-231 Board Had Been Replaced

Adjusting/Setting

2-1-1. Settings for the Intercom Systems
- Intercom system selection and adjustment
- Program audio signal setting and adjustment
- Setting and Adjustment of Intercom Line Connected to INTERCOM Connector

2-1-2. Setting the Program Microphone Signal
- Set the output level of microphone.

When the BKP-5972 (AD-130 Board) Had been installed.
- SDI MIC1 Level Adjustment
- SDI MIC2 Level Adjustment

Regarding above adjustments, see maintenance manual of BKP-5972.

3-5-5. When the DM-110 Board Had Been Replaced

Adjusting/Setting

2-3-1. Selecting the Input/Output Signal
- RET3/PROMPT Switch Setting

2-3-5. Adjusting the Triax Signal
- Set the cable compensation.
- Adjust the black level of camera signal.
- Adjust the level of camera signal.
- Adjust the camera signal level and the black level with MSU-700/750.

3-5-6. When the BKP-5972 (AD-130 Board) Had Been Replaced

Adjusting/Setting

- SDI Video Phase Adjustment
- SDI Y Black Adjustment
- SDI R-Y/B-Y Black Adjustment
- SDI Y Level Adjustment
- SDI R-Y/B-Y Level Adjustment
- SDI MIC1 Level Adjustment
- SDI MIC2 Level Adjustment

Regarding above adjustments, see “Option Board Signal Adjustment” of system manual or maintenance manual of BKP-5972.

3-6. Removing the Top Cover

Note

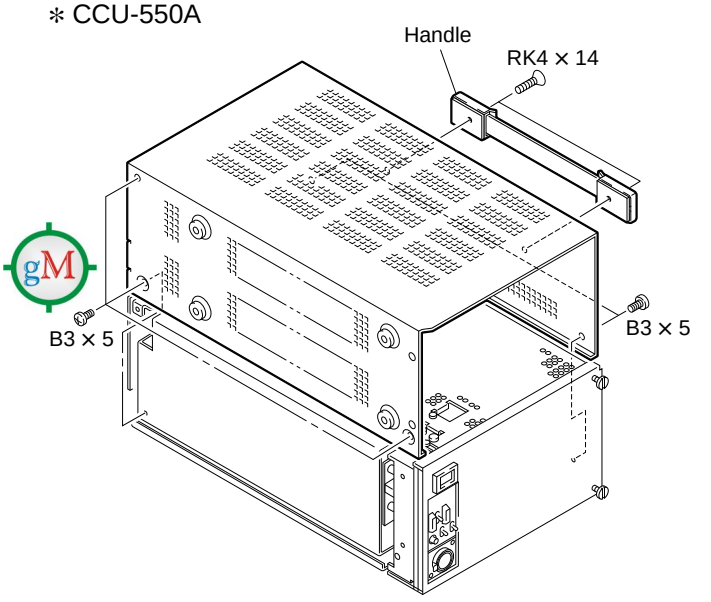
The power is automatically turned off when the top cover is removed during operation. When removing the top cover, be sure to confirm that the camera system being connected doesn’t work.

1. Remove the five screws. (for CCU-550A)
   Remove the five hexagonal sockets screws. (for CCU-550AP)
2. Remove the two screws (or hexagon socket screws) of the handle.

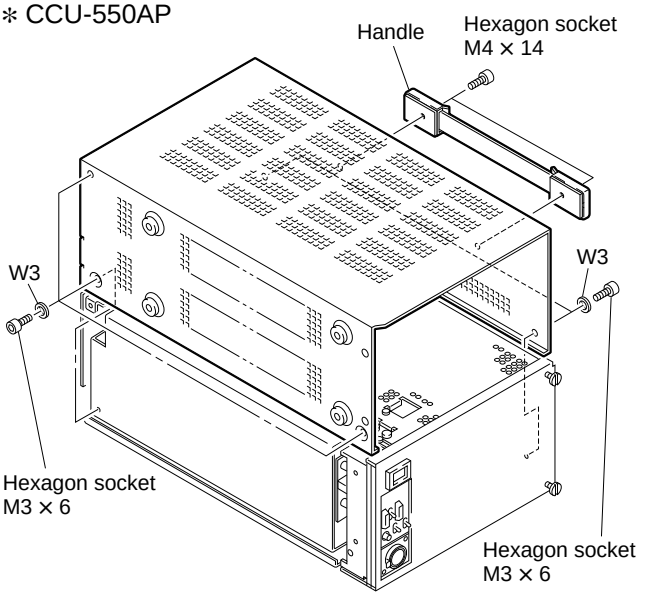
Note

Since CCU-550AP uses hexagon socket screws, be sure to use an allen wrench when removing the screws.

∗ CCU-550A



∗ CCU-550AP



3-7. Replaceing the Power Unit

WARNING

The power unit is critical for safe operation. Be sure to replace it with the specified part to avoid the danger of a fire or electric shock.

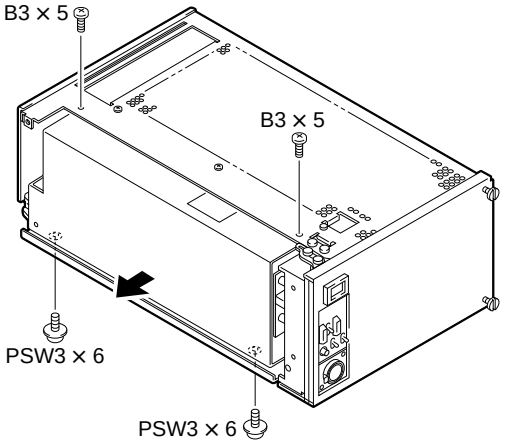
When replacing, be sure to use the specified part.
SWICHING REGURATOR : ⚠ 1-468-412-11

1. Pull out the power cord from the rear panel of the CCU-550A/550AP.
2. Remove the top cover. (Refer to section 3-6. Removing the Top Cover.)
3. Remove the four screws (or hexagon socket screws).

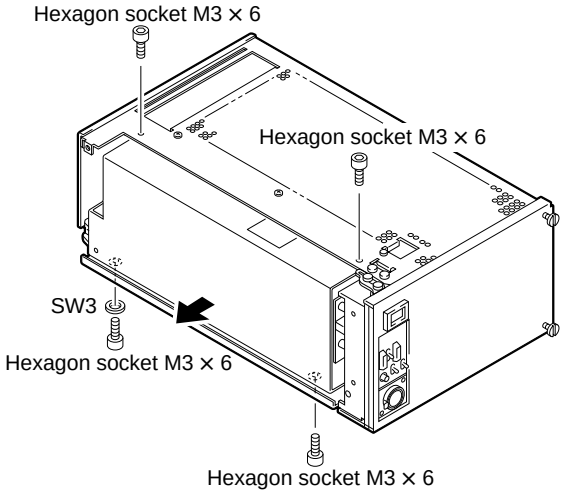
Note

Since CCU-550AP uses hexagon socket screws, be sure to use an allen wrench when removing the screws.

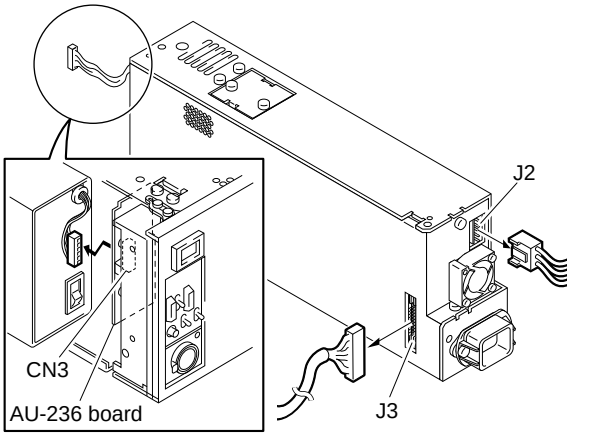
∗ CCU-550A



∗ CCU-550AP



4. Disconnect the three connectors (J2/PS-564, J3/PS-565, and CN3/AU-236) from the power unit.



5. After replacement of the power unit, assemble the power unit in the reverse procedures of removal.
6. Connect the power cord, turn on the power of the CCU, and confirm that the CCU operates normally.

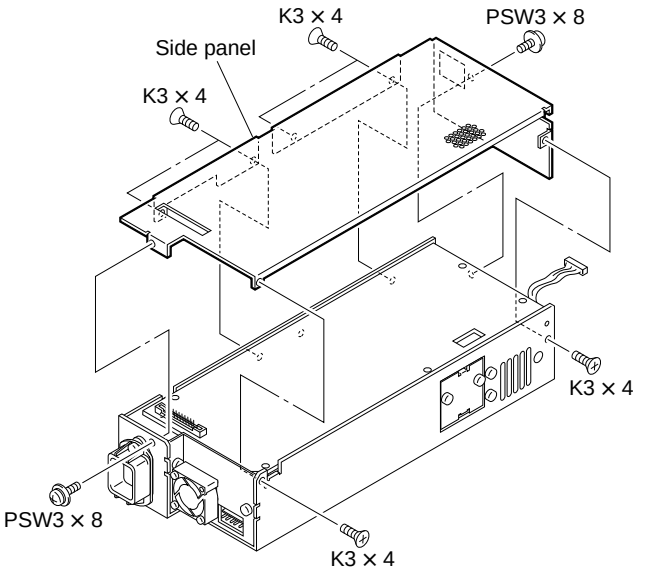
3-8. Replacing the Fuse

WARNING

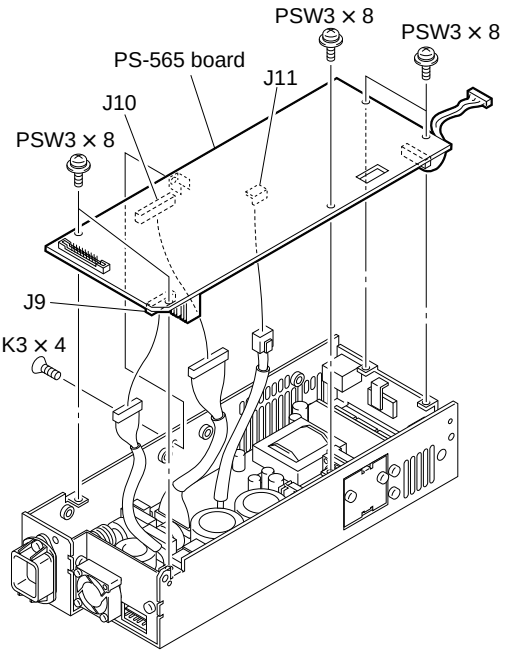
The fuse is critical for safe operation. Be sure to replace it with the specified part to avoid the danger of a fire or electric shock.

When replacing, be sure to use the specified part.
FUSE (H. B. C) 6.3 A 250 V : ⚠1-576-233-11

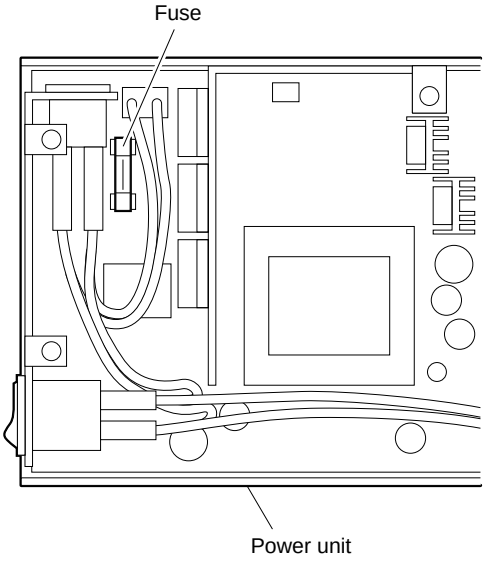
1. Pull out the power cord from the rear panel of the CCU-550A/550AP.
2. Remove the top cover. (Refer to section 3-6. Removing the Top Cover.)
3. Remove the power unit. (Refer to section 3-7. Removing the Power Unit.)
4. Remove the eight screws and open the side panel as shown in the figure below.



5. Remove the six screws, disconnect connectors (J9, J10, and J11), and remove the PS-565 board.



6. Replace the fuse on the PS-565 board.

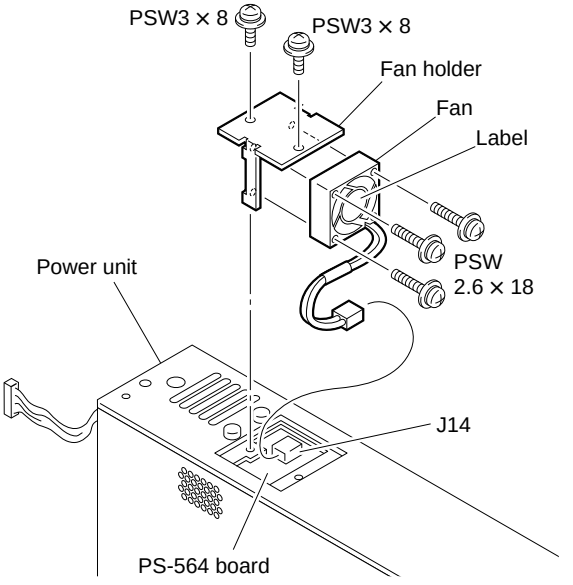


7. After fuse replacement, install the power unit in the main unit in the reverse order of removal.
8. Connect the power cord, turn on the power of the CCU, and confirm that the CCU operates normally.

3-9. Replacing the Fan

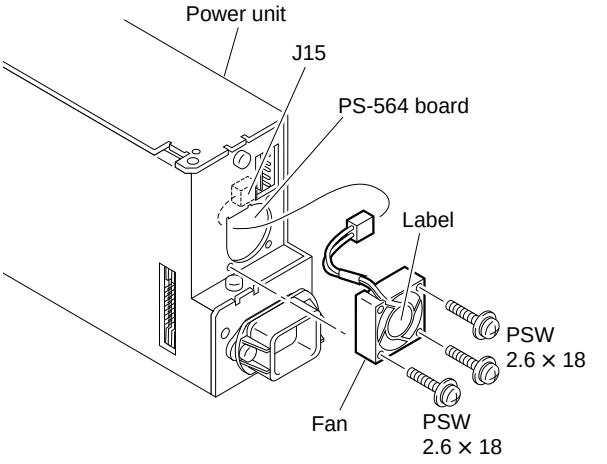
Front side

1. Pull out the power cord from the rear panel of the CCU-550A/550AP.
2. Remove the top cover. (Refer to section 3-6. Removing the Top Cover.)
3. Remove the power unit. (Refer to section 3-7. Removing the Power Unit.)
4. Remove the two screws, and pull out the fan holder (with fan).
   Disconnect connector (J14) from the PS-564, then remove the fan holder.
5. Remove the three screws, then remove the fan from the fan holder.
6. After replacement of fan, assemble the fan block in the reverse procedures of removal.
   Note
   Pay attention to mounting direction of the fan and the harness.



Rear side

1. Pull out the power cord from the rear panel of the CCU-550A/550AP.
2. Remove the top cover. (Refer to section 3-6. Removing the Top Cover.)
3. Remove the power unit. (Refer to section 3-7. Removing the Power Unit.)
4. Remove the three screws, and remove the fan from the power unit.
   Disconnect connector (J15) from the PS-564 board, then remove the fan.
5. After replacement of fan, assemble the fan block in the reverse procedures of removal.
   Note
   Pay attention to mounting direction of the fan and the harness.



3-10. Backup Battery Replacement

Note

When replacing the lithium battery, ensure that the marks + and − are correctly oriented.
If connected incorrectly, injuries and damage to objects in the periphery may result from tears and leakage of fluid.

When replacing, be sure to use the specified part.
BATTERY, LITHIUM CR-2450 : ⚠1-528-229-11

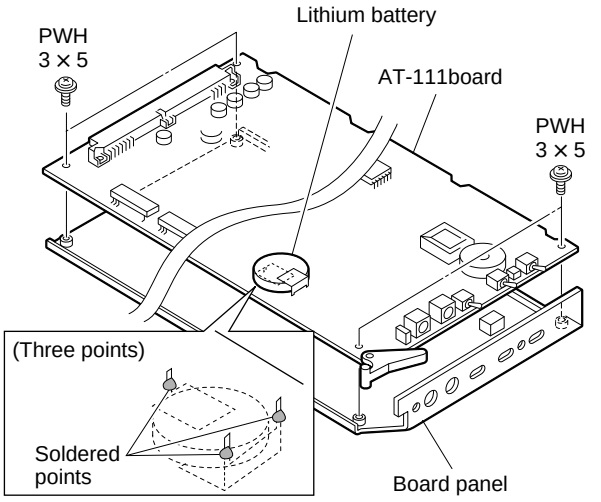
If the trouble below occurs when the CCU is used, replace the lithium battery on the AT-111 board.

Trouble

The setting of saturation is preset when the power switch of the CCU-550A/550AP is turned on and off with the CCU PAINT CLEAR switch (S106) on the AT-111 board set to OFF.

Replacement

1. Loosen the two coin screws and open the front panel.
2. Pull out the AT-111 board.
3. Remove the four screws, then remove the board panel.
4. Unsolder the three points on the AT-111 board and replace the lithium battery.



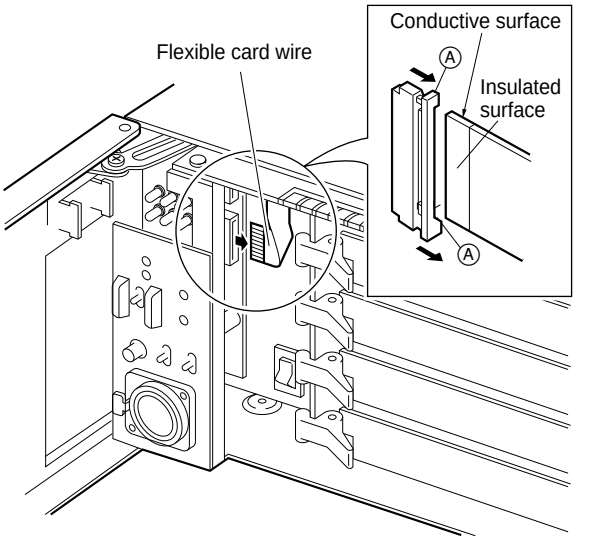
3-11. Description on Flexible Card Wire

3-11-1. Removal and Installation of Flexible Card Wire

A flexible card wire is used between the MB-688 and AU-236 boards. Be careful not to break the flexible card wire. This may remarkably shorten the span of life. Handle it with care.

Removal

1. Turn off the power.
2. Take out section Ⓐ in the direction indicated by the arrow and pull out the flexible card wire.



Installation

Notes

- Do not insert the flexible card wire obliquely.
- Confirm that no stain and dirt exist on the conductive surface of the flexible card wire.

1. Put the insulation surface of the flexible card wire toward you and insert it firmly into the connector.
2. Return section Ⓐ to the former position and lock the connector.

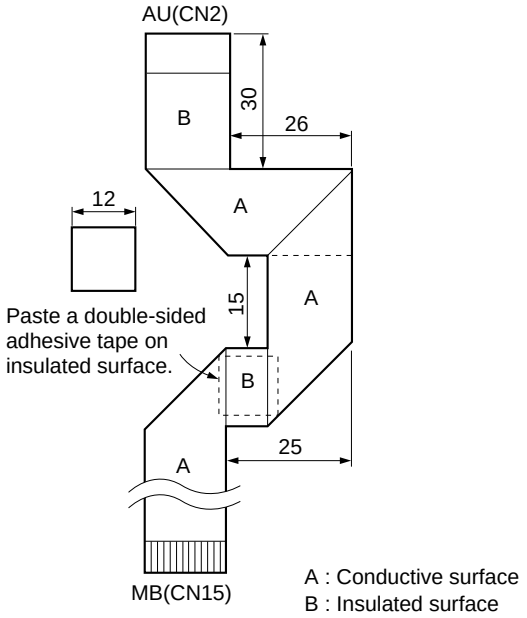
http://getMANUAL.com

3-11-2. Forming

If using a new flexible card wire, hand form as shown in the figure in advance.

Note

Never reform the flexible card wire after being folded once.



3-12. Fixtures

Extention board (EX-534) : A-8277-639-A

3-13. Notes on Spare Parts

1. Safety Related Components Warning

Components marked ⚠ are critical to safe operation. Therefore, specified parts should be used in the case of replacement.

2. Standardization of Parts

Some repair parts supplied by Sony differ from those used for the unit. These are because of parts commonality and improvement.
Parts list has the present standardized repair parts.

3. Stock of Parts

Parts marked with “o” at SP(Supply Code) column of the spare parts list may be not stocked. Therefore, the delivery date will be delayed.

4. Units Representation

The following represented units are changed or omitted in writing.

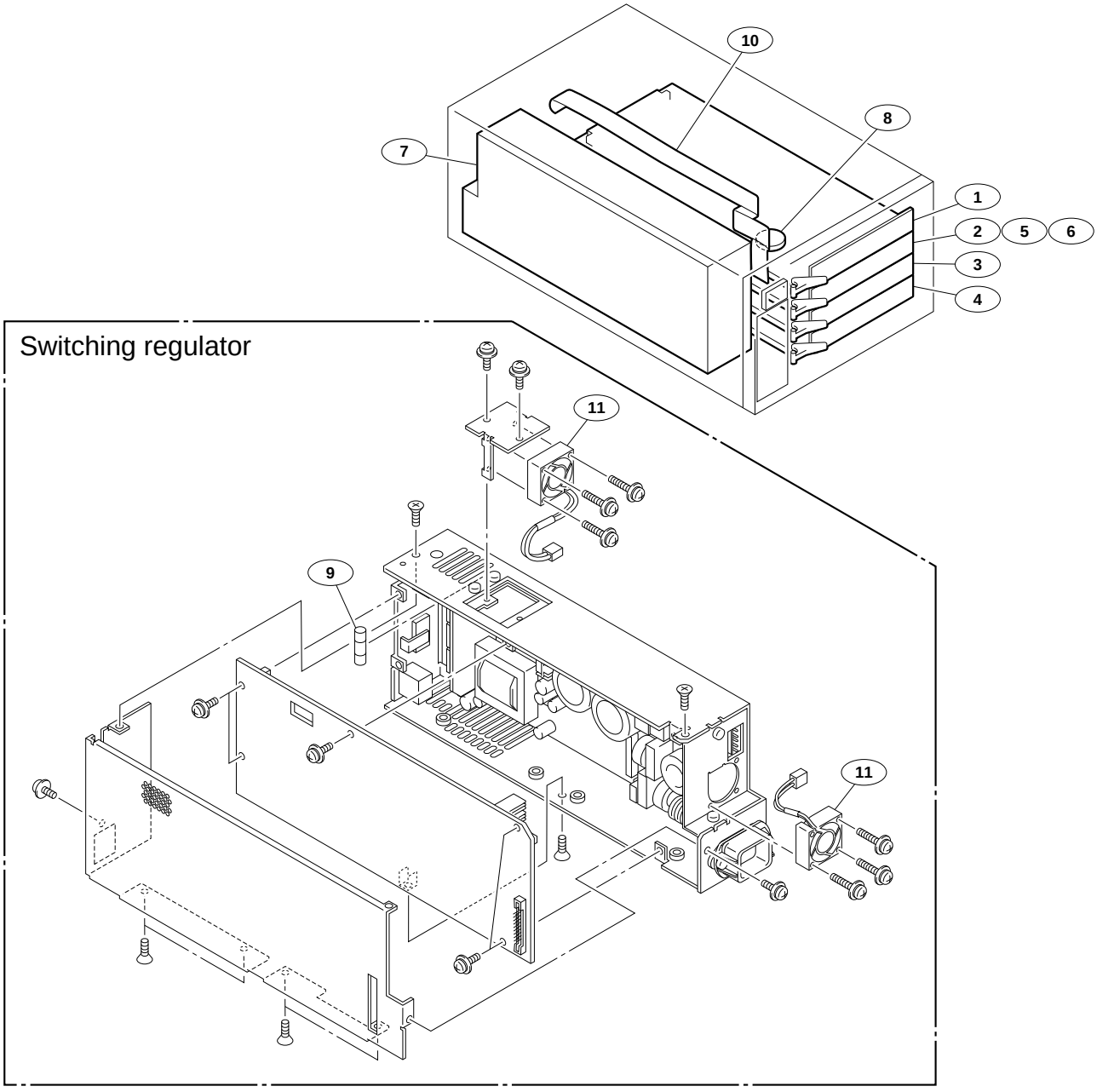
Units		Representation
Capacitance	μF	uF
Inductance	μH	uH
Resistance	Ω	Abbreviation
Temperature	˚C	XXX-DEG-C

5. Destination Representation

The part indicated “For J/UC/CE” in the spare parts list is used in the unit written below.

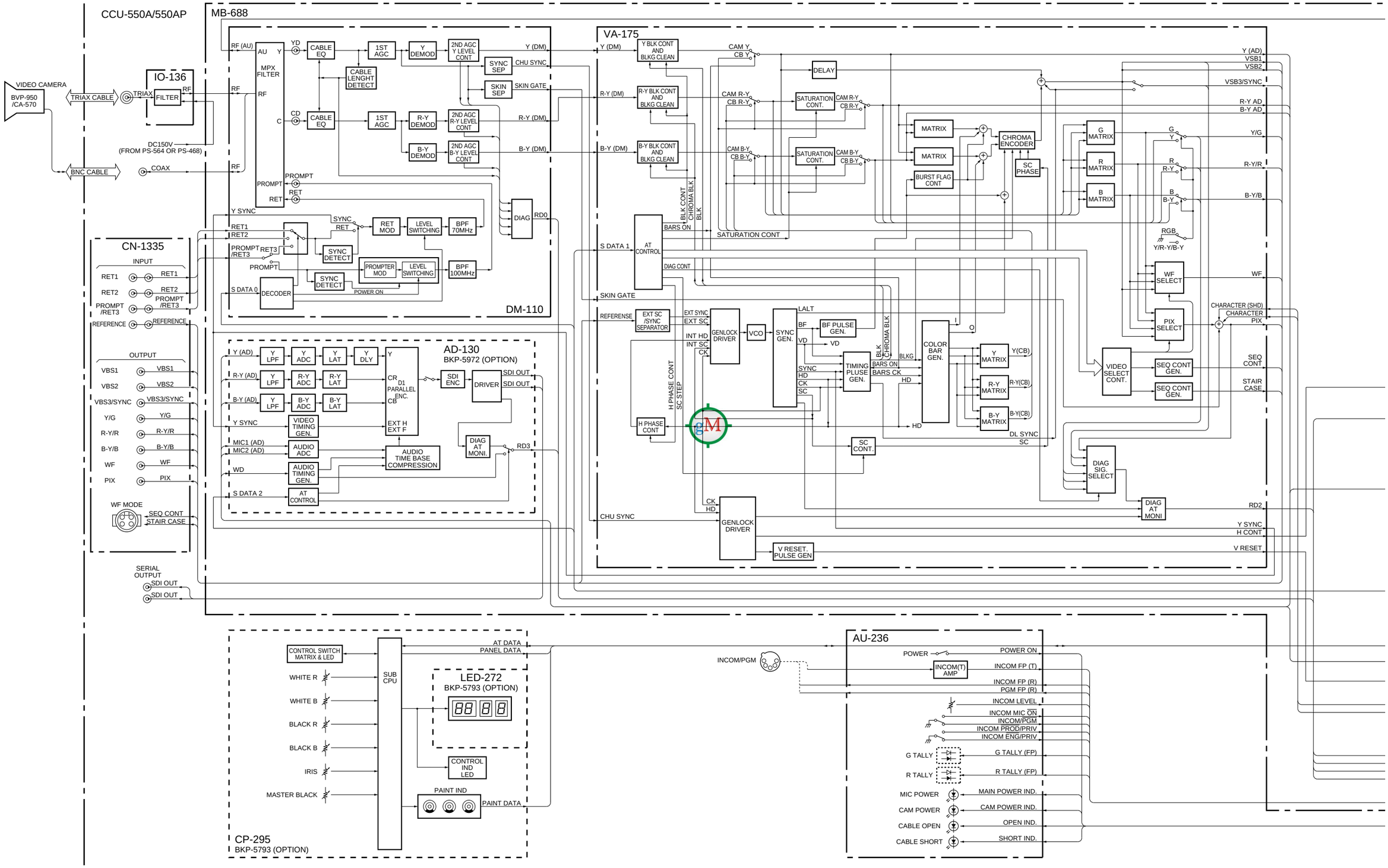
For J : The part is used in a unit for Japan.
For UC: The part is used in a unit for U.S.A. and Canada.
For CE : The part is used in a unit for regions except the above countries.

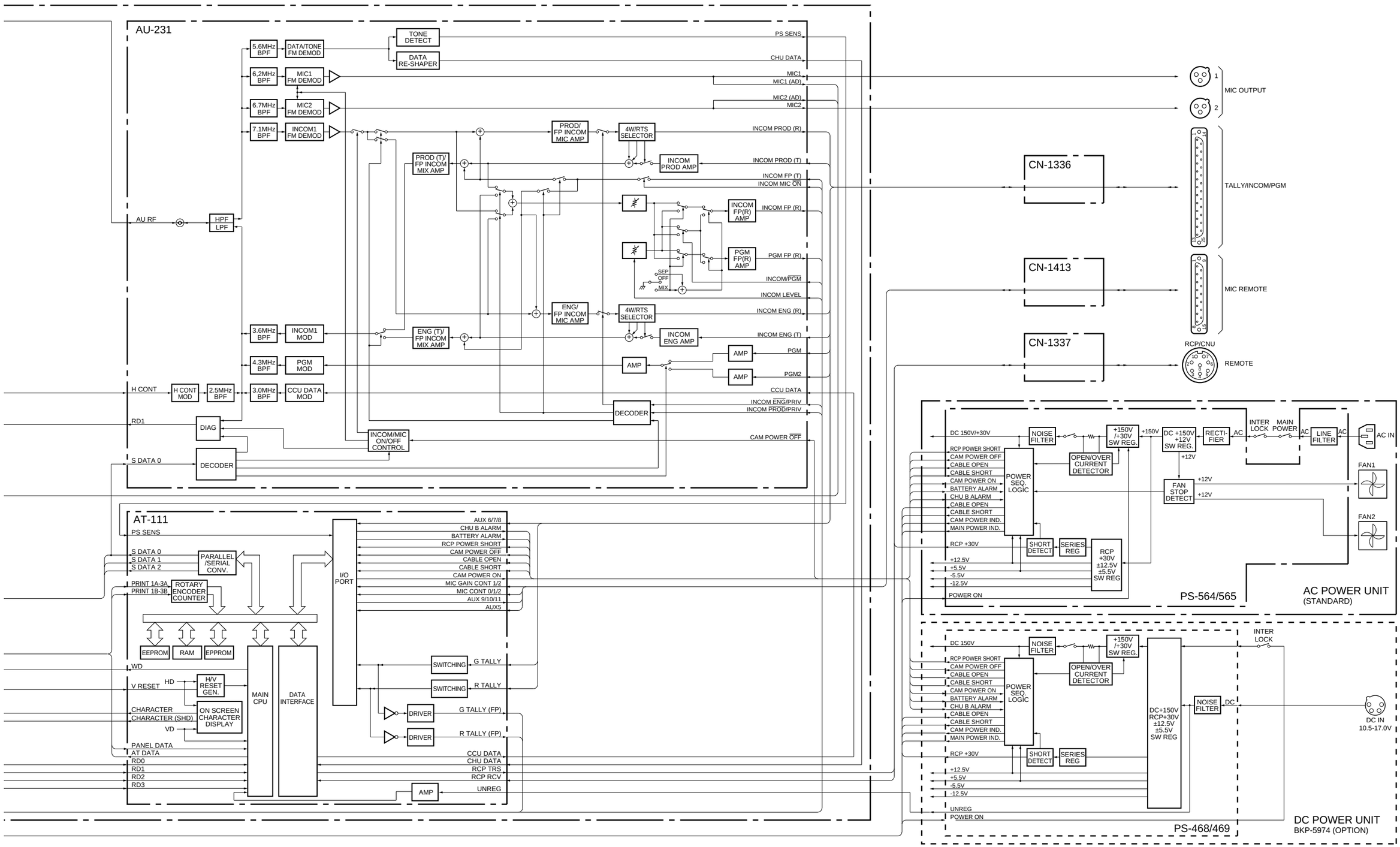
Section 4
Spare Parts



No.	Part No.	SP	Description
1	A-8277-376-A	o	MOUNTED CIRCUIT BOARD AT-111
2	A-8277-378-A	o	MOUNTED CIRCUIT BOARD VA-175A(UC)
3	A-8277-380-A	o	MOUNTED CIRCUIT BOARD AU-231
4	A-8277-382-A	o	MOUNTED CIRCUIT BOARD DM-110
5	A-8277-399-A	o	MOUNTED CIRCUIT BOARD VA-175B(J)
6	A-8277-403-A	o	MOUNTED CIRCUIT BOARD VA-175P(CE)
7	⚠ 1-468-412-11	s	REGULATOR, SWITCHING
8	⚠ 1-528-229-11	o	BATTERY,LITHIUM CR-2450
9	⚠ 1-576-233-11	s	FUSE (H.B.C) 6.3A 250V
10	1-777-336-12	s	CABLE,FLEXIBLE FLAT(30 CORE)
11	9-884-100-01	s	MOTOR, FAN

Section 5
Block Diagram


CCU-550A/550AP
MB-688
VIDEO CAMERA
BVP-950
/CA-570
TRIAX CABLE
TRIAX
IO-136
FILTER
RF
DC150V
(FROM PS-564 OR PS-468)
BNC CABLE
COAX
MPX
FILTER
AU
C
CABLE EQ
CABLE LENGHT DETECT
1ST AGC
Y DEMOD
2ND AGC Y LEVEL CONT
SYNC SEP
SKIN SEP
R-Y DEMOD
2ND AGC R-Y LEVEL CONT
B-Y DEMOD
2ND AGC B-Y LEVEL CONT
PROMPT
RET
Y SYNC
SYNC
RET MOD
LEVEL SWITCHING
BPF 70MHz
BPF 100MHz
SYNC DETECT
PROMPTER MOD
DECODER
POWER ON
DIAG
RD0
DM-110
CN-1335
INPUT
RET1
RET2
PROMPT /RET3
REFERENCE
OUTPUT
VBS1
VBS2
VBS3/SYNC
Y/G
R-Y/R
B-Y/B
WF
PIX
WF MODE
SEQ CONT
STAIR CASE
SERIAL OUTPUT
SDI OUT
AD-130
BKP-5972 (OPTION)
Y LPF
Y ADC
Y LAT
Y DLY
R-Y LPF
R-Y ADC
R-Y LAT
B-Y LPF
B-Y ADC
B-Y LAT
D1 PARALLEL ENC.
SDI ENC
DRIVER
VIDEO TIMING GEN.
AUDIO ADC
AUDIO TIMING GEN.
AUDIO TIME BASE COMPRESSION
DIAG AT MONI.
AT CONTROL
MIC1 (AD)
MIC2 (AD)
WD
S DATA 2
VA-175
Y BLK CONT AND BLKG CLEAN
R-Y BLK CONT AND BLKG CLEAN
B-Y BLK CONT AND BLKG CLEAN
DELAY
SATURATION CONT.
MATRIX
BURST FLAG CONT
CHROMA ENCODER
SC PHASE
G MATRIX
R MATRIX
B MATRIX
RGB
Y/R-Y/B-Y
BLK CONT
CHROMA BLK
BLK
BARS ON
SATURATION CONT
AT CONTROL
DIAG CONT
S DATA 1
SKIN GATE
REFERENCE
EXT SC /SYNC SEPARATOR
GENLOCK DRIVER
VCO
SYNC GEN.
BF PULSE GEN.
TIMING PLUSE GEN.
COLOR BAR GEN.
H PHASE CONT
SC STEP
SC CONT.
DL SYNC
SC
HD
CK
CHU SYNC
V RESET. PULSE GEN
Y MATRIX
R-Y MATRIX
B-Y MATRIX
WF SELECT
PIX SELECT
VIDEO SELECT CONT.
SEQ CONT GEN.
CHARACTER (SHD)
CHARACTER
PIX
SEQ CONT
STAIR CASE
DIAG SIG. SELECT
DIAG AT MONI
Y SYNC
H CONT
V RESET
CP-295
BKP-5793 (OPTION)
CONTROL SWITCH MATRIX & LED
WHITE R
WHITE B
BLACK R
BLACK B
IRIS
MASTER BLACK
SUB CPU
AT DATA
PANEL DATA
LED-272
BKP-5793 (OPTION)
CONTROL IND LED
PAINT IND
PAINT DATA
AU-236
INCOM/PGM
POWER
INCOM(T) AMP
INCOM FP (T)
INCOM FP (R)
PGM FP (R)
INCOM LEVEL
INCOM MIC ON
INCOM/PGM
INCOM PROD/PRIV
INCOM ENG/PRIV
G TALLY
R TALLY
MIC POWER
CAM POWER
CABLE OPEN
CABLE SHORT
POWER ON
G TALLY (FP)
R TALLY (FP)
MAIN POWER IND.
CAM POWER IND.
OPEN IND.
SHORT IND.



OVERALL BLOCK

CCU-550A/550AP

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SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer :

Check the metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 3.5 mA. Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 5.25 V, so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 20 V AC range are suitable. (See Fig. A)

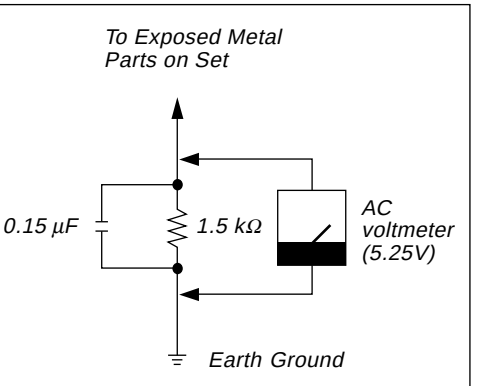

Fig A. Using an AC voltmeter to check AC leakage.

CCU-550A (J, UC)
CCU-550AP (CE) J, E
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